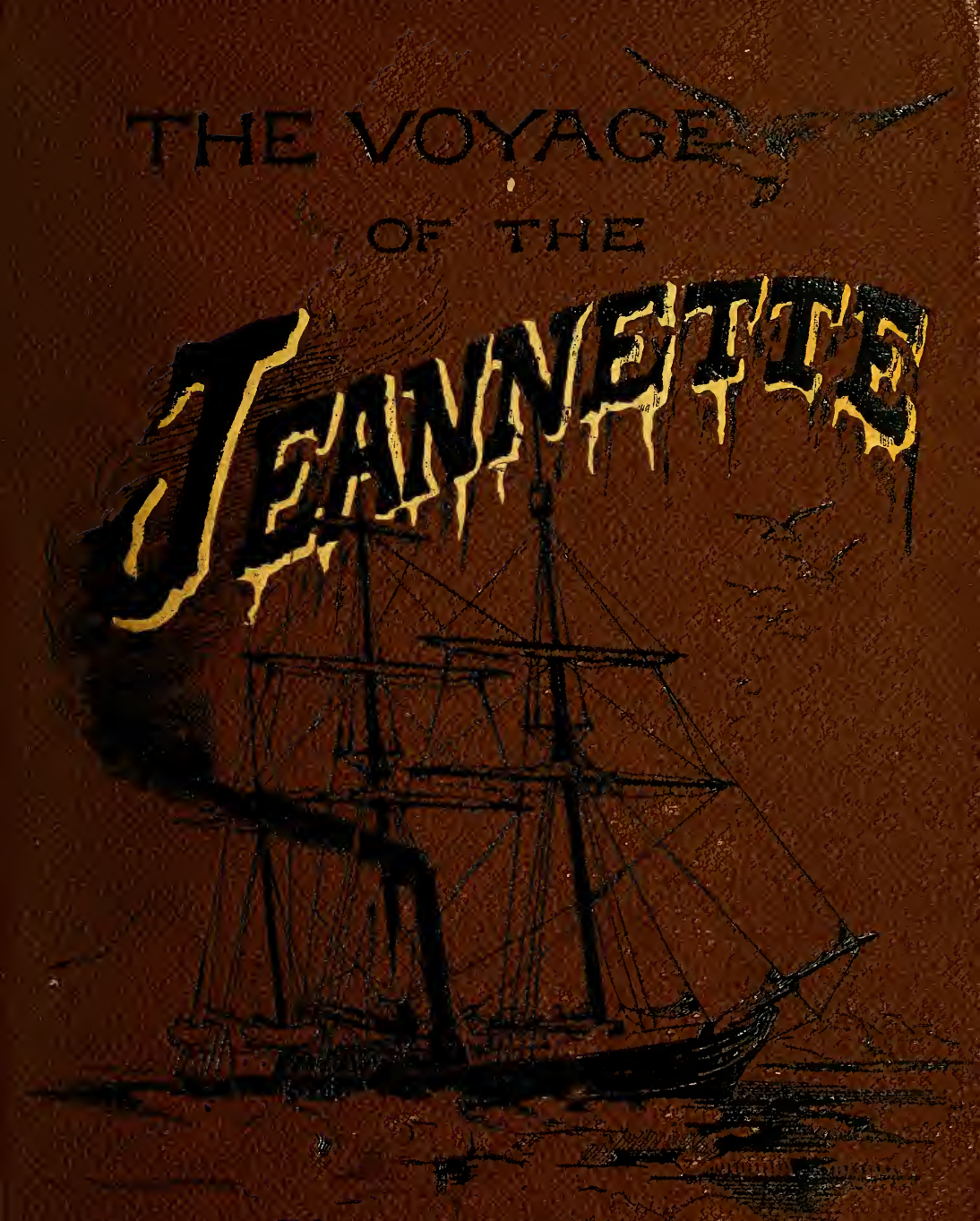
THE VOYAGE OF THE JEANNETTE



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THE

VOYAGE OF THE JEANNETTE.

THE SHIP AND ICE JOURNALS

OF

GEORGE W. DE LONG,

LIEUTENANT-COMMANDER U. S. N., AND COMMANDER OF THE POLAR EXPEDITION OF 1879–1881.

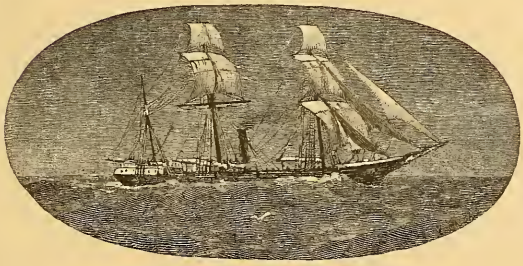
EDITED BY HIS WIFE,

EMMA DE LONG,

WITH TWO STEEL PORTRAITS, MAPS, AND MANY ILLUSTRATIONS ON WOOD AND STONE.

IN TWO VOLUMES.

VOL. I.



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1884.

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PREFACE.

In the preparation of this volume the editor has availed herself first, of the private papers of Lieutenant-Commander De Long, and her own recollection and notes; and secondly, of the testimony given in public and private by the survivors of the Jeannette. It seemed right, in a work which is essentially a tribute to human worth, to introduce the narrative with a brief biographical sketch of the commander of the expedition up to the inception of the undertaking, with special reference to the qualities of character and education of circumstances which led directly to his proposal of an Arctic expedition. The preparations for the voyage continue this personal sketch, as well as put the reader in possession of all necessary facts relating to the plans of the projectors and the measures taken to ensure success.

So much was requisite as an introduction to the narrative itself. For that recourse was had to the letters written by Lieutenant-Commander De Long after leaving San Francisco, and before dismissing the consort which accompanied the Jeannette to St. Lawrence Bay; to the private journal which he kept from the beginning of the voyage to the sinking of the ship, and to the two small journals in which he recorded the fortunes of the expedition after the ship was abandoned.

In preparing the closing chapters of the work, the testimonies given by the survivors have been carefully compared and made the basis for a consecutive narrative which should complete the history of the expedition.

The illustrations have been studied with great care. The smaller ones in the text have been reproduced from diagrams and sketches made in the journals, by Mr. Newcomb, the naturalist of the party, and by Captain Grönbeck of the Lena; the larger ones have been from the hand of Mr. M. J. Burns, whose experience in the Arctic had given him special facility for making truthful renderings, and his work has been carefully examined and approved by officers of the expedition. The portraits have been taken from the best sources. That of Lieutenant-Commander De Long is from a painting by Mr. E. W. Perry; that of Mr. Bennett was engraved for this work; and those of the officers and other members of the expedition are from the best photographs obtainable. The frontispiece of the second volume is from a drawing made on the spot by Mr. A. Larsen. The maps were drawn for the work, with the exception of that descriptive of the route of the Little Juniata, which is a reduction of the government map in the "Voyage of the Polaris."

The scientific results of the expedition are only partially recorded in the text of the work and in papers included in the Appendix. The government will hereafter issue the notes of the naturalist, the meteorological observations, and the electrical and auroral

observations of Lieutenant Chipp, and it has been thought advisable, therefore, to omit them from this work.

The thanks of the editor are due to Mr. James Gordon Bennett for his constant sympathy, interest, and aid; to Chief-Engineer Melville for his frequent assistance and special contributions; to the other survivors of the Jeannette for their cheerful and ready response to all requests for information; to Colonel W. B. Remey, Judge Advocate General U. S. N., and Lieutenant W. H. Jaques, U. S. N. Finally, the editor desires to acknowledge gratefully the consideration and kindness which her work has met with from the Secretary of the Navy and other members of the Department at Washington.

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THE VOYAGE OF THE JEANNETTE.

CHAPTER I.

THE COMMANDER OF THE EXPEDITION.

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George Washington De Long was born in the city of New York, August 22, 1844, of a family of Huguenot descent. His parents, who moved to Brooklyn when he was four years old, had no other child, but they had adopted a niece of his mother's, who was his principal playmate. His childhood was one of great seclusion. His mother, especially, was almost morbidly solicitous for him, so that he was jealously guarded from outdoor influences, and restrained from the ordinary sports of boyhood. The world seemed to the anxious mother full of perils for her boy, and she was unwilling that he should meet them in the near pursuits of swimming, boating, and skating. Home was made bright and happy, and every innocent and safe

pleasure granted him, not only out of parental love, but with the constant purpose to shield him from danger and accident. His father was of an easy temper, who interfered but little with his education, only exacting strict obedience.

It was not hard for the boy to give this obedience, for the commands of the mother were never direct but through the subtler influence of a strong maternal love, and the disposition of the boy was one of generosity and docility. He was a hard student, thorough in his application to books, and faithful to his school work. His spirit and energy, hemmed in upon the adventurous side, found exercise in an intellectual ardor, and he was a fiery little orator and writer. Nevertheless, and it may be because of the repression to which he was so constantly subjected, he was restless and filled with an uneasy desire for larger liberty.

When he was eleven or twelve years of age he fell in with some tales of naval exploits of the War of 1812, which recounted the heroism of young midshipmen, Porter and Farragut being especially named, and his ambition was kindled to make as great a reputation for himself in the same profession. Shortly after, in 1857, he was selected as a candidate, from the public school which he attended, for an appointment to the Naval Academy, but his parents refused their consent, to his bitter disappointment. They had other plans for him, and proposed to enter him at the Free Academy, now the College of the City of New York, when an accident occurred which led to a change in his life. On one of those straight marches home from school which parental law had made a part of the routine of his life, he was the mark for a party of his companions who shot their snow and ice balls at the exclusive little

De Long. A blow on the ear caused an injury which required two or three months' detention in the house under the doctor's care, and in this enforced leisure the boy and his mother discussed his future career. She gave him the choice of being a doctor, a priest, or a lawyer, and of the three professions that of doctor seemed to open the largest promise of activity. At any rate, when the boy had recovered he proposed to find out something about the life before he prepared for it, and so engaged himself with his friend who had been treating him, and stayed with him several months.

A familiarity with the outside of a doctor's life and an attendance upon a few painful operations satisfied George De Long that he had no aptitude for this profession, and he found little difficulty in bringing his mother to his way of thinking, when he unfolded to her the incessant risks which a doctor ran of contracting a great variety of contagious diseases. The next profession was that of divinity, and his mother was urgent that he should study for orders; but without going through any preliminary experimenting with the life of a priest, the boy resorted to the argument which had already served him well, and drew such a picture of the privations and hardships of a priest's life, and the dangers to which he was exposed in his contact with the sick and the dying, that he succeeded in dimming for his mother the brighter spectacle of a possible cardinal, and in securing a reprieve for himself.

The arguments which he employed were the ingenuities by which he persuaded his mother; they were not the convictions which moved him. He had a resolute, courageous spirit, which impelled him to a life of free activity; but he had also the fine spirit of obedience and loyalty, which forbade him to break away

from the restraints of home, and roughly rebel against the authority of love. Meanwhile he amused himself with books, the friends which his secluded life had given him, and spent day after day at the Mercantile Library, where he read voraciously, feasting especially upon books of adventure and travel. He attached himself to the librarian, helped him about his duties, and even filled the office for a few months during an interregnum. His restlessness was not satisfied, but was stimulated by his reading, and Captain Marryat and other seductive mariners again gave him an almost uncontrollable longing for the sea.

He was still, however, an obedient son, and when his parents refused to yield to his wishes, he yielded to theirs, and entered the law office of the Hon. John Oakey, who became warmly attached to the boy and placed great confidence in him. It was shortly before the breaking out of the War for the Union, and upon Mr. Oakey's entering the service, George begged hard to accompany his friend, and urged him to use his influence in persuading the inflexible parents. Mr. Oakey did indeed urge them to let the boy go, telling them that a little rough experience would curb his restless and ambitious spirit, and make him more willing upon his return to remain at home the rest of his days, — a well-worn line of reasoning which often has an uncommon likeness to good sense.

It may readily be believed that the perils of army life would scarcely affect the imagination less than those belonging to a learned profession, and neither the boy nor Mr. Oakey could carry the day. This incessant friction, however, began to produce its result, and it is not unlikely that as George's ardor was increased by his sense of national danger, so his parents' will was

weakened by the contagion of spirit in the community. A place in the army had been denied the boy, and he turned again with redoubled zeal to his first love, the navy. He went to his father and said: "I want to go to the Naval Academy. You say you will not assist me; but if I obtain an appointment myself, will you give me your consent and allow me to enter?" His father laughed at what he thought was his hopeless determination, and answered, "Very well, if you can accomplish such a feat, I will make no further objection," and his mother also gave her consent to what she imagined to be impracticable.

With this perfunctory sort of permission the boy went to work with a will. He wrote to Washington for the necessary information regarding candidates, and then applied to know if there were any vacancy to be filled by an appointment from the Third Congressional District, represented at the time by Hon. Benjamin Wood. The Department replied that there was no vacancy, that gentleman having made his appointment. George meanwhile had enlisted the aid of his friend Mr. Oakey, who went at his request to Mr. Wood and urged the boy's name, and of Father, now Vicar General, Quinn, who was Mrs. De Long's spiritual adviser. Father Quinn knew the boy well and was ready to help him. He also went to Mr. Wood and easily proved himself a powerful ally. It must be said, however, that there was no influence quite so effective as the boy's indomitable will. He learned suddenly that a cadet who had been appointed by Mr. Wood had been obliged to leave the Academy from some affection of the eyes. This was his opportunity, and he gave no one any rest till he received the appointment, when he went to Newport, where the Academy was then stationed, and passed his examination.

Just at this juncture the officers at the Academy received a dispatch from Mr. Welles, Secretary of the Navy: "Do not accept Mr. Wood's appointee for the navy." Back to New York rushed De Long and demanded of Mr. Wood the reason for the dispatch. Mr. Wood showed him a letter from the Secretary, by which it appeared that the nomination of De Long had been delayed, and that the cadet whose place he was to fill had recovered his health and been reinstated. "So that ends the matter," said Mr. Wood; but it did not at all end it in De Long's mind. He burst into a vigorous invective against the Department. It was all wrong. Mr. Wood had been imposed upon. It was because he was a Democrat that this injustice had been done, and the Republican Secretary was depriving the Congressman of his rights. He ought not to stand such treatment an hour. Mr. Wood was amused and moved by the zeal of the young advocate, and finally said: —

"Do you sit down, Mr. De Long, and write what you want to the Secretary. I will sign the letter, and you can take it to Washington yourself if you like."

The letter was written and De Long set off at once to Washington. It was in the fall of 1861, when the trains were packed with soldiers, and the boy had to stand all the way from Philadelphia to Washington. He reached the city at six in the morning, and as soon as he could get something to eat, presented himself at the door of the Secretary's office, and was ready when the hour came for business. He entered and handed Mr. Wood's letter to the Secretary. Mr. De Long often enjoyed telling of that interview; how he watched the various expressions of Mr. Gideon Welles's face as he read the tempestuous letter, which the boy had written.

When the Secretary finished, he pushed his spectacles up and looked at his visitor.

"And you are Mr. De Long, are you? Well, well, this is a very strange state of affairs. Mr. Wood seems very much excited; but he is laboring under a delusion. We have no intention of slighting him in any way. You can return to the Academy. I will give the necessary orders for your reception there, and please say to Mr. Wood that he shall not be deprived even of his imaginary right."

So it happened that there were three cadets from the Third Congressional District this time, and one of them, who had won his position by sheer persistence, was entirely satisfied with the state of affairs. He applied himself vigorously to the work of the Academy, and was graduated with distinction in 1865, just as the war came to a close.

He received his first orders for sea duty in November of that year, when he was ordered to Boston to report to Admiral Stringham for duty on board the U. S. Steamer Canandaigua. Upon arrival at the navy yard he went at once to the vessel to inspect his quarters. He looked all over the ship, and finally entered the steerage where he was to spend the next two years. He inspected it very thoroughly and found that there were but two berths in it, while it was to be occupied by four midshipmen; two therefore, it was plain, would have to swing in hammocks. This was not at all according to his views of what was proper, and off he set to see the admiral about it, and have the matter righted. On his way across the yard, he met some officers who asked him where he was going. He told his errand, and they at once approved it in the most emphatic manner.

"That's right!" they said. "The thing should be attended to. Just speak to the admiral positively about it, and you 'll get what you want."

The young midshipman was shown into the office of Admiral Stringham, an erect gentleman with white hair, and sharp black eyes, who sat at his desk writing. His visitor advanced toward him, cap in hand, and said: —

"Admiral, I am Midshipman De Long of the U. S. Steamer Canandaigua. Sir, I have been inspecting my quarters on board, and I find only two bunks in the steerage for four midshipmen. I came, sir, to ask you to have two more berths put in before we start for sea."

The admiral looked up quickly and said: "So you are Midshipman De Long of the U. S. Steamer Canandaigua?"

"Yes, sir."

"Well, Midshipman De Long of the U. S. Steamer Canandaigua, I advise you to return on board the U. S. Steamer Canandaigua, and consider yourself very happy that you have any bunks at all in the steerage."

The admiral was better than his word, however. His amusement was greater than his amazement, and he ordered the additional bunks to be made. Years afterward he met again the innocent and resolute midshipman and laughed heartily over their first encounter.

The cruise of the Canandaigua was along the western coast of Europe and Africa and in the Mediterranean, and was a little over three years in duration. Mr. De Long was promoted successively to be ensign and master, and, shortly after his return to New York, to be lieutenant. After a short leave of absence, he was ordered to the U. S. Steamer Lancaster, then at Norfolk,

Va., but while she was preparing for sea he was placed on duty in Washington for practice in signals. Whilst on this duty he was telegraphed for to come to his mother's sick-bed. His father had died while the Canandaigua was absent on her cruise, and Mrs. De Long had been left alone. She had a passionate love for her son, and his long absence, in a life which was repugnant to her choice for him, was a grievous burden to her. She was brave and unselfish, and refused to embitter his life with her complaints; but her death, which occurred now, brought afresh to him a sense of the relations they had sustained to each other, and his naturally buoyant nature was greatly depressed when he rejoined the Lancaster, which had been ordered to the South Atlantic.

His depression was deepened by the fact that he was waiting for the expiration of a three years' delay, which had been agreed upon between him and the father of the lady to whom he had offered himself in marriage, and whom he had met at Havre, where she was living at the time of the Canandaigua's cruise in French waters. His eager, impetuous nature wore out two of the three years, when the delay became insufferable. He obtained leave of absence, and presented himself in Havre in February, 1871, where his persistence and resolution made good the third year of his waiting. The Franco-Prussian War was nearing its close. An armistice had been declared, but Havre was accessible only from the sea; communication with Paris was cut off by the Prussian army and the breaking up of bridges and railways. The harbor was occupied by a number of foreign men-of-war, sent for the protection of neutral interests, and among these was the U. S. Steamer Shenandoah.

Such neutral interests as Mr. De Long enjoyed were especially in need of protection by a United States man-of-war; for after all difficulties had been removed, and the resolution taken at noon of March 1st to have the marriage performed in the evening of that day, since the bride's father was compelled to return to America, fresh difficulties sprang up. Marriage in France is a civil contract, and Mr. De Long saw the necessity of securing the presence and services of General Glasgow, the United States Consul. The consul, however, had gone into the country, and for several hours the anxious bridegroom was driving frantically about on a search for him. General Glasgow, when he was at last found, began to explain the formalities which were required; but Mr. De Long was too busy for any trivial matters, and was off on the more important errand of buying a wedding ring. The bride's family meanwhile had secured the services of the Rev. George Washington, a clergyman of the Church of England.

At eight o'clock a few guests assembled, and the clergyman and consul were present. Everything was in readiness when General Glasgow turned to the clergyman and said: —

"I suppose you have the proper authority to perform this ceremony. You know in France marriage is a civil contract."

"I have no authority whatever," he replied; "but I suppose that if you, as United States Consul, witness the ceremony, the marriage will be legal."

"On the contrary," said General Glasgow, "consuls have no power to marry or witness marriages on French soil; the United States Minister at Paris is the only person having such authority. This marriage cannot proceed; it will not be legal." Here was a sore

perplexity. It was impossible to send for Mr. Washburne; it was impossible for Mr. Washburne to reach the waiting couple. Moreover, the steamer which was to take Captain Wotton, the father of the bride, was to sail for America in a couple of hours. The fates seemed against the marriage, and Mr. De Long was looking in vain for a way out of the dilemma, when the consul, whose learning had been so destructive, suddenly drew upon his reserve legal forces, and exclaimed: —

"There is a United States man-of-war in port, and under the flag she flies this clergyman has a perfect right to perform the ceremony of marriage between two American subjects."

This simple and brilliant expedient was seized upon with alacrity. Messengers and servants were sent off in various directions. Captain Wells of the Shenandoah, who was a friend, immediately prepared his ship for the ceremony by displaying all his bunting and decorating with Chinese lanterns. He sent boats for the party, who rowed out at half after nine of a brilliant starlight night, and were received by the officers in full dress uniform, and with all the music that could be summoned. The following entry was made in the ship's log: "March 1, 1871. From 8 P. M. to midnight. . . . At 10 P. M. the ceremony of marriage between Lieutenant George W. De Long, U. S. Navy, and Miss Emma J. Wotton, of Hâvre, was performed by the Rev. Dr. Washington, of the Episcopal Church of Hâvre."

At the end of April Lieutenant De Long was ordered to duty in the Equipment Department at the New York Navy Yard, and in January, 1872, he was ordered to the Nantasket as executive officer. The ship cruised in the Gulf, and in July he was detached from the

Nantasket and ordered for the same duty to the Frolic, stationed in New York Bay.

At the close of January, 1873, Lieutenant De Long was ordered to the Juniata, which was attached to the North Atlantic squadron. While at New York, in May of the same year, news came that Captain Tyson, seaman Nindemann, and seventeen others of the crew of the Arctic exploring steamer Polaris, had been picked up by a whaler, while floating south on an ice-floe. The report which they gave of the condition of the Polaris induced the United States Government to send a man-of-war to the relief of that vessel, and the Juniata was selected for the duty. She was slightly strengthened for her special work, and dispatched to the coast of Greenland. Lieutenant De Long entered into the plans of the voyage with alacrity, and though separating from his wife and child, he announced his intention of volunteering for any unusual duty which might arise. Something of the spirit in which he engaged in the enterprise may be gathered from a letter which he sent home while on the cruise. Writing from Sukkertoppen, Greenland, July 16th, he says: —

"Thus far the trip has been a very monotonous one to me, and I don't suppose I shall begin to see any excitement in it till our boat expedition leaves the ship at Upernavik. Then to me the desirable portion of this trip will begin; and if with the blessing of Providence we are so fortunate as to find the Polaris and her people, I shall consider our trip to Greenland and its icy mountains as one well worth remembering."

The Juniata reached Upernavik, Greenland, without coming upon any further intelligence of the Polaris, and it was not deemed prudent to take her further to the north. Instead, it was thought best to send a boat expedition to make a search along the coast, and Lieu-

tenant De Long at once volunteered to take command of the search party. Captain Braine accepted him and gave him orders for the expedition. These orders, and an extract from the report which Lieutenant De Long made upon his return, will best describe the search, and the report will show more clearly than any comment upon it the courage, resolution, and coolness of the commander of the perilous boat expedition : —

U. S. Steamer Juniata (3d rate).
Upernavik, Greenland, *July* 31, 1873.

Lieutenant George W. De Long, U. S. N.,
Commanding the Steam-Launch Juniata.

Sir, — The Little Juniata, the largest steam-launch of this ship, has been carefully strengthened with outer planking, also with an iron stem plate, and her propeller guarded with an iron frame. She is thoroughly equipped, arranged, and provisioned for sixty days, under your supervision, for a search for the U. S. Steamer Polaris, along the fast inshore ice to the northward of this place towards Melville Bay.

You will assume command of her, and at the first appropriate moment proceed to carry out said search as far as it is positively prudent to advance to the northward.

In navigating these northerly and almost unknown waters, much must be left to your discretion, and your movements must be controlled by the short time the U. S. Steamer Juniata will remain at Upernavik, which is until August 25, 1873.

You are enjoined to advise with the ice-pilot furnished you, who has twice passed over the waters you are about to navigate and wintered in the frozen Arctic regions.

The Little Juniata is not to be jeopardized or pushed into the ice-packs, if you meet them ; nor is she, or the lives of those on board, to be involved in any way it is possible to avoid ; for you must remember that the U. S. Steamer Tigress, a vessel equipped and prepared for ice cruising, will soon proceed to Baffin's Bay into Smith's Straits, to search for the Polaris, up to the point where she was last seen (Northumberland Island) in October, 1872, and you are reconnoitring,

previous to her going possibly to pass an Arctic winter in 77° North.

Should you find the Polaris, or her officers and crew, you will return with dispatch to Upernavik, at which place the Juniata will remain up to the date previously mentioned; and you are not, under any circumstances within your control, to be absent from this ship beyond fifteen days; for which time you have coal, at a daily consumption of five hundred pounds.

Should you not find the Polaris by the time you have consumed one half of your coal, you are to return to Upernavik, and sooner if you meet any formidable ice obstructions.

Should the U. S. Steamer Tigress leave Upernavik before you return, she will be directed to keep a lookout for you; and should you meet her under any circumstances that warrant it, you will remain with her, if her commander deems it most prudent you should do so; but, should the Little Juniata be able to prosecute the voyage of return to Upernavik, I wish you to do so, and be at that place on or before August 25, 1873.

Should you not be at Upernavik by that date, I will leave there coal and provisions sufficient for your return to Godhavn, Disco Island, where I expect to remain until September 20th or 25th, or the latest days previous to the close of navigation by the ice in those waters.

With hopes your search will prove successful, and that you may find the Polaris, or gain some tidings of her, or be the means of conveying through the Esquimaux to those on board the news of the vessels now in search of her, I sincerely wish you success in your undertaking. I assure you I shall await with great interest your return to this ship from the hazardous duty for which you and those associated with you have volunteered. You will be accompanied by Lieutenant Charles W. Chipp, U. S. N., Ensign Sidney H. May, U. S. N., Pilot Henry W. Dodge; Richard Street, Boatswain's Mate; Frank Hamilton, machinist; William King, seaman extra; Martin T. Maher, ordinary seaman.

I am, most sincerely yours,

D. L. Braine, *Commander U. S. N.*,
Commanding U. S. S. Juniata and Senior Officer present.

An Esquimau, Jacob Lÿnghe, accompanied the party as an interpreter and coast pilot between Upernavik and Cape Shackelton. Lieutenant De Long's report of the expedition notes that he had before been charged by Commander Braine with all the necessary preparations for the expedition when the Juniata was at St. John's, Newfoundland, where the launch had been specially strengthened.

The dimensions of the Little Juniata were: —

Length over all, 32 feet 6 inches.	Breadth, 8 feet 4 inches.
Length of keel, 28 feet 3 inches.	Depth, 4 feet 4 inches.

She was sloop-rigged and carried a three-bladed propeller.

"On Saturday, August 2d, at 12.55 P. M.," the report proceeds, "the boat being in readiness, provisioned, and supplied with four tons of anthracite coal, I received your final orders and shoved off from the ship with the dingy, containing twelve hundred and seventy-eight pounds of coal, in tow, and heartily cheered by the ship's company, proceeded on our voyage to the northward under steam, with a fine breeze from the southwest. I immediately organized the party and divided them in two watches: one in charge of Lieutenant Chipp, and consisting of himself, Mr. Dodge, Hamilton, and Street; and the other in my own charge, and composed of the remaining four of the party, the Esquimau being for the present excluded. This arrangement of watches was kept up during our entire absence, the officers and men working alike, and turning in and out with each other.

"At 3.30 the same afternoon we passed the small settlement of Kingitok, about twelve miles to the northward, and working our way among countless icebergs and through narrow passes between islands, arrived without accident at Tessi-Ussak at eleven o'clock that night, and in obedience to your orders left the dingy at that place to be brought back by a Danish boat, landed six hundred pounds of coal from her for our use on returning, took the remainder into the launch, and were ready to depart at midnight. The weather, however,

had set in bad, blowing fresh from the southwest, with a thick fog, and I deemed it prudent to wait until morning, or until there was some chance of working through the fog with safety.

"Tessi-Ussak is a small place of some half dozen Esquimau huts, besides the house in which the chief trader, Jensen, resides. Jensen is the Dane who accompanied Dr. Hayes on his several expeditions, as a dog driver and hunter, and is ap-

parently an excellent man, speaking English well, and willing and anxious to be of service to Americans, of whom he speaks in the most enthusiastic terms. At his hands we received a warm welcome, and such hospitalities as his recent arrival and consequent unsettled condition would permit.

"Tessi-Ussak has a small harbor, but it is nearly always full of icebergs, and we were forced to anchor among them, too close for comfortable contemplation, and with the chance of any one of them turning over upon us. The night being rainy and comparatively warm (45°) many icebergs broke up, and the cracking and breaking and turning over and over continued during our entire stay.

"At ten A. M. Sunday, August 3d, the fog having lifted to some extent, we got under way and steamed away to the northward, passing in between Brown Island and the mainland, working our way among icebergs and keeping close in to the mainland to keep in smooth water, and to be ready to slip in and anchor, should a fog overtake us. At four P. M. had passed Cone Island and Wedge Island to the westward, and sighted Cape Shackelton and the Horse's Head, a prominent island off this cape, right ahead. Passed to the eastward, of the island, and at eight P. M., having Cape Shackelton close aboard, determine the position of the boat to be in lat. 73° 42′ N., long. 57° W.

"I had calculated before leaving the ship that we should be enabled with an expenditure of five hundred pounds of coal per day to make an average speed of four knots per hour under a steam pressure of twenty pounds; and with a view to keeping the feed water for the boiler as fresh as possible, a steam-pipe had been carried from the boiler to the water-tank, for the purpose of melting fresh-water ice, which we should pick up on the way, and put in the tank. We found upon trial thus far that the expenditure of steam to melt the ice was too great to keep up our proposed speed, and I concluded to supply the boiler with salt-water, which of course we had to dip up from the water outside. Running with salt-water increased our expenditure of fuel, and I now feared that, instead of coal for fifteen days as originally calculated, we would have only enough for eight days. With our sails we may be able to do better, should we be favored with fair winds. This day we had light northerly winds, smooth sea; average temperature of the air 45°, of the water 41°.

"At four A. M. Monday, August 4th, passed inside of the Duck Islands, Baffin Islands bearing true N. E., weather thick, breeze coming up fresh from N. and W. and cloudy, with indications of coming fog. This state of affairs continuing at three P. M. I kept the boat away to the eastward, made sail, and stood in for a headland, which, from its position and my calculation of the boat's run, I assume to be Wilcox Head, in about lat. 74° 40′ N. In getting under this headland, the fog continuing, we made the boat fast to an iceberg, and waited

for a clearing up. At five P. M. the fog clearing, we slipped from the berg and rounded the headland to the northward. My object in keeping in close to the shore, though we were working through icebergs, was to get a sight of the Devil's Thumb, a remarkable pillar of land north of Wilcox Head, and from which I intended to take a fresh departure for crossing Melville Bay. But on rounding Wilcox Head we saw nothing of the Devil's Thumb, and I imagined I might have been deceived in the boat's position in the afternoon. Our accommodations were so limited, the boat had to carry so much, and the difficulty, not to say danger, of getting outside of the boat was so great, that the log could not be hove with any accuracy, and our reckoning was at the best not the most reliable. The currents set us out of our reckoning frequently, sometimes being to the northward and sometimes to the southward.[1]

"Discovering another high headland to the northward of the supposed Wilcox Head I stood on, getting in tolerably open water, and having a smooth sea and no wind with clear sky, we headed for this new high land. On going below at eight P. M. I directed Lieutenant Chipp to call me when nearly up with this headland, or in case of any change in the weather. At ten P. M. Lieutenant Chipp called me, a fog having shut in, and land being entirely obscured, much ice being encountered in the shape of pack ice and icebergs, and some new ice an inch in thickness. I immediately put about and attempted to retrace our way, which we succeeded in doing for several miles, but finally, owing to the increasing thickness of the fog, we missed our track and were brought to a stand-still in the pack. As far as we could see we were caught in solid ice from about one to two feet thick, with large hummocks and icebergs surrounding us. By steady ramming of the ice and

[1] It is well to note here for the information of any who may get into Allison Bay, that the chart is wrong in leaving it to be imagined that the bay is free except as to icebergs. It is filled with small islands, running along about fifteen miles from the glacier line, and extending from Cape Seddon nearly fifteen miles to the southward toward Wilcox Head. It was the presence of these islands which confused us in reference to Wilcox Head. — G. W. De L.

working a clear space about us, we occasionally made small cracks in the floes, and succeeded in forcing our way a little at a time, getting occasionally in open patches of water and among loose ice, and making two or three miles before being brought up again by solid ice. I had headed the boat to the westward on losing our way in the ice, and I knew that every foot we made in that direction was toward the open water. The temperature was from 30° to 32°, the rigging was covered with rime, and the new ice was rapidly forming around us and increasing in thickness. I did not dare to stop for a clearing up of the fog, lest we should be firmly frozen in, and so kept the boat under way with full steam pressure, grinding through the ice where we could, ramming it wherever there was a chance of success, and following every little lead to the westward.

"In all this I was guided by Mr. Dodge, the ice-pilot, whose previous experience in the Arctic regions enabled him to give me good advice, and upon whose judgment in this emergency I relied, and handled the boat accordingly. The plan of keeping to the westward proved a wise one, for at 8.30 A. M. we were rewarded by coming into quite large spaces of open water, and at nine A. M. were pleased to detect a little swell, giving indications of an approach to the open sea beyond. By ten A. M. we were quite clear of the pack after our twelve hours of uneasiness, and with no more damage to our little craft than a slight scratching and splintering of our strengthening plank, occasioned by the new ice through which we forced during the night.

"I immediately headed the boat to the N. W. (true), N. E. magnetic, and the fog clearing up by noon, we sighted at two P. M. three islands on our starboard quarter, the Sabine Islands, marked on the chart as being in lat. 75° 28′ N., long. 59° 55′ W. At the same time made out the glaciers beyond to the N. E., a large number of icebergs, and a curious looking hill with two peaks, which no doubt was the Cape Walker marked on the chart, or land in its immediate vicinity. Generally speaking, the chart is inaccurate to a great extent to the northward of Cape Shackelton, the coast line, as we found

it, being nearly always a glacier line. To the best of our ability to see and judge, the ice-pack was tolerably solid from these Sabine Islands to the coast, showing that we were not far removed from the edge of the Melville Bay pack. The entire bay was dotted with clusters of icebergs.

"Between four and six P. M. we were favored with a light fall of snow, the thermometer standing at 42°, with a light S. E. wind and moderate swell. Knowing that everything that could be accomplished by the boat must be done in fine weather, and that it would be well to keep a hold on the land as much as possible, owing to the uncertainty of our position and the inaccuracy of the chart, I determined to push on with greater speed, in order to be as near the land as possible, which at its nearest point was about fifty miles distant, and to this end fired up afresh, making a large hole in our fuel.

"At eight o'clock the next morning, Wednesday, August 6th, we had no land in sight ahead, but we found ourselves on the edge of the ice-pack, with a thick fog shutting in and no signs of a lead through. At about eleven A. M. land showed itself abeam, bearing N. E. (true), in the shape of two high hills, which Mr. Dodge recognized as the Peaked Hill, marked on the chart as being in lat. 76° 18′ N. and long. 62° W. Just as we sighted this land, Mr. Dodge discovered a lead in the pack to the westward, but the fog shutting in thicker than ever, we were unable to follow it, and I decided to anchor to an iceberg rather than risk the boat on the edge of the pack. We accordingly made our ice-anchor fast at one P. M., but discovering the berg to be full of cracks and looking very much like breaking up, I shifted our anchorage to a small ice-cake and banked fires.

"At this point I took an account of fuel remaining, and calculated that it was very nearly half gone. We had accomplished this distance without any more serious mishap than our danger of being firmly caught in the ice in Allison Bay. Cape York was only forty miles off, and the people of the Polaris might be there waiting for relief. In the foggy state of the weather burning coal without advancing would be a waste of fuel, and I decided to let the fire go out under the boiler, hoping to ac-

complish something under sail should the fog lift or a chance present itself of getting open water to the northward. Accordingly, in the morning of Thursday, August 7th, we let the fire die out. The thermometer was at this time at 38°, but we suffered no additional inconvenience on that account.

"During the forenoon it promised several times to clear up, the sun showing itself occasionally for a few moments, but with little or no effect on the fog. Becoming tired of inaction we slipped from the ice at 9.45 A. M., and making sail stood to N. W. (true) with a light S. E. wind and swell.

"At noon I determined the position of the boat to be in lat. 75° 52′ N., long. 64° 05′ W. by our dead reckoning, and the last bearing we had of the land in the neighborhood of the Peaked Hill. At four P. M. came in sight of the ice-pack again, and immediately hauled the boat up to W. N. W. (true). Discovering a lead in the pack to the northward and westward, stood into it for about five miles until Mr. Dodge pronounced it a false lead, the ice closing in ahead, four feet thick, some of last year's ice, and some older. Brought by the wind and beat out of the lead. At eight the wind freshened from S. S. E. and we commenced to work to the westward, as much as possible keeping clear of the ice. At midnight hauled alongside of an iceberg to fill up with fresh-water ice for drinking and cooking. Moderate sea.[1]

"At 1.30 A. M. Friday, August 8th, sighted high land, bearing N. W. by N. (true), and trending away to the northward in an apparently low neck. This Mr. Dodge pronounced our anxiously looked for Cape York, and at 2.30 A. M., having worked clear of detached pieces of floe ice, stood in toward the land, which we calculated to be about eight miles distant. At three o'clock A. M. the fog shut in again thick and we lost sight of Cape York. At the same time the wind freshened to a gale

[1] It was while thus employed that Mr. Dodge, the ice-pilot, noticed a crack in the berg, and mentioned the fact to Lieutenant De Long. The order was at once given to shove off, and the Little Juniata had scarcely reached a safe distance, when, with a loud report, the iceberg was rent in pieces. The launch was tossed and tumbled by the waves caused by the commotion, but otherwise escaped unharmed.

from the S. E., and I was compelled to bring the boat by the wind and reef down as snug as possible. At this time, had we been in open water, Cape York could have been reached without any difficulty, but as far as we could see to the northward, the ice was in a solid pack three to four feet thick, and we were struggling along on the edge of it looking for a lead, and working to the westward in so doing. To the N. E. the ice was also in a firm pack, with icebergs and hummocks close enough to prevent the opening of the ice to any extent. At noon I establish the position of the boat in lat. 75° 48′ N., long. 66° 50′ W.

"In the afternoon the S. E. gale had caused a fearful sea, and working as we were on the edge of the ice-pack, our situation became one of great danger. The wind had started the Melville Bay pack out from the land, and to the northward and westward, making a regular bight in which we were fairly placed. We had to carry sail in order to keep the boat under control. Steam would have been of no use, since the Little Juniata could not for one moment have steamed against such a gale. Laying to was not to be thought of, lest we should drift to the pack and be ground to pieces. The prospect at this time was a terrible one. Icebergs near us, one hundred feet in height, had the spray from the sea thrown over their tops. On approaching the edge of the pack ice we could see a scene of great confusion. The bordering ice would be broken in large pieces, and hurled upon the more solid ice, only to be displaced by fresh pieces torn adrift by the gale, and rolled over and over upon the face of the pack. The fate of the boat and the party appeared certain. We were half buried in the seas at times, shipping quantities of water and deluging everything in the boat. It rained in torrents. Had our sail split or our mast gone, nothing could have been done. Providentially, everything held, and we were enabled to keep the boat under some control. The fog was very thick, making it extremely difficult to see the ice-pack each time until we were fairly alongside of it, in which case we had to wear ship at once without delay, not knowing in so doing whether we could clear this grinding and crushing mass of ice or not.

"This state of affairs continued until ten o'clock on the

THE ADVENTURE IN THE LITTLE JUNIATA.

morning of Saturday, August 9th, at which time there came a lull. We had then been in this heavy gale thirty hours, and were in a very cold and exhausted state. Everything was completely saturated with water, and we had so much water in the boat that I feared she had sprung a leak. The Little Juniata behaved wonderfully well, and did more than such a small craft could have been expected to do. With our fire room flooring covered with water, the coal bunkers half full of the same, every locker in the boat afloat, all our bailing must have made little impression on this bulk of water which was constantly increased by the seas shipped at every one of the fearful plunges of the boat and the showers of spray thrown over us.

"We hailed with great relief the lull in the wind which gave promise of a breaking up of the gale, and fearing for the safety of the boat should the wind subside leaving this fearful sea running, we attempted to get a fire lighted under the boiler. This was no easy matter, and for a while seemed impossible. The matches we had taken with us were wet and useless. The tinder was likewise saturated and of no avail. After several hours' work we succeeded in getting a friction match dry enough to ignite, — Ensign May having warmed and dried it by keeping it next his body for that purpose, — and with this match we lighted a candle in a lantern, which was almost immediately extinguished by a gust of wind. By a repetition of the same process Mr. May secured another lighted match, and this time we succeeded in keeping our candle alight. We attempted then to build a fire, but every stick of wood was soaking wet. By taking cotton waste and punk, wet as they were, and pouring oil plentifully over them, we succeeded at last in lighting our fire.

"During this time the wind had moderated and hauled to the S. W. I calculated the boat to have been in lat. 75° 48′ N., long. 68° 30′ W. on the port tack (wind at S. E. true), and long. 67° 10′ N. on the end of each starboard tack. We had been running on a line nearly east and west during the gale, making about twenty-five miles on each tack before wearing ship, and obliged to go over nearly the same ground on ac-

count of icebergs, luffing to the wind as occasion served or required.

"At this point I was forced to the conclusion that prosecuting the search any longer was out of the question. My orders read positively to return when the fuel was half expended, and on no account to risk the boat in the ice-pack. The fuel was half gone, and what was left was in such a condition as to lead to very grave doubts as to its being reliable for steaming on the return. As far as we could see to the northward and eastward was pack ice, and it was in this direction that our port lay. I did not know how close to the middle pack we had been blown during the gale, and I feared if the wind came out in the N. W. we should not only be blown down upon the Melville Bay pack, but be followed by detached portions of the middle pack, and be caught firmly between the two. Again, if we had succeeded in working our way through a lead in towards the land and had reached it, we had not fuel enough to work our way back through the pack ice, supposing that a N. W. wind had not closed us in for the year.

"Up to this time we had seen nothing of the Polaris or of her people. Had they been at Cape York, it would not have added to their chances of safety had our little party increased their number, with the ice effectually closing our means of exit. Anxious as we were to find them, and tell them of relief coming, I could not further risk our party being caught in the ice in an open boat, with the season closing, new ice forming, and only fuel enough to keep us warm for a few days. I did not know how far the U. S. Steamer Tigress was behind us, nor what our chances would have been of her rescuing us, had we been frozen in. The weather was uncertain, another gale like our previous one was by no means unlikely, and my orders expressly forbade me to jeopardize the lives of the party by putting the boat in the pack ice.

"Reluctantly, therefore, I was compelled to announce that the search must be given up, and headed the boat to the S. E. on our return, having steam enough to go ahead at four P. M. Having gone up on the inshore track, I concluded to return by the offshore, or mid-channel track, in hopes that we might

see something of the Polaris or her people, but in this we were not gratified.

"The wind continued hauling to the westward, soon reducing the S. E. swell, and creating a swell from the N. W. Before this we went along at a good rate, the weather clearing gradually, the ice-pack disappearing astern.

"Sunday, August 10th, opened clear and pleasant, so continuing till past meridian. For the first time since leaving the ship I succeeded in getting observations, and established the boat's position at noon, in lat. 74° 45′ N., long. 59° 37′ W., having run nearly one hundred and fifty miles during the preceding twenty-four hours.

"At one P. M. sighted the Devil's Thumb, bearing true N. E. by N., distant about sixty miles, verifying our position at noon with tolerable accuracy. The weather here became cloudy and squally from W. S. W., with snow, hail, and rain. Wind shifting again at four o'clock to S. W., with moderate sea, and so continuing till nine P. M., from which time to midnight we had light, variable airs.

"Monday, August 11th, opened clear and pleasant with freshening breezes from N. E. At four A. M. sighted land on port bow, which I recognized as Cape Shackelton, and at 5.30 A. M. sighted the Duck Islands on port beam. This day and the day previous we had considerable trouble with our fires. Knowing that we were short of fuel, we economized as much as possible, and were sometimes rewarded by the engine stopping itself for want of steam.

"At noon got our latitude by meridian altitude of the sun to be 73° 38′ N., or on the parallel of the Horse's Head, which now showed itself on our port beam. We then headed in for Brown Island off Tessi-Ussak, favored with a fine breeze from N. N. W., with long swell, which led me to think that the weather had been unsettled after our departure from Cape York. At midnight we were inside of Brown Island, heading in for Tessi-Ussak.

"At one A. M. Tuesday, August 12th, sighted Jensen's house, and discovered a steamer apparently at anchor in the harbor. She immediately thereafter steamed out toward us,

and coming alongside of us proved to be the U. S. Steamer Tigress, Commander James A. Greer, from Upernavik the previous evening. I boarded her and communicated to Commander Greer the result of our reconnaissance, imparting to him the circumstances of wind, weather, ice, and other details relating to his coming journey, up to four o'clock on the afternoon of Saturday, August 9th, at which time we left the neighborhood of Cape York. I exhibited to him my chart, showing our track going and returning, reported to him the prevalence of pack and new ice in Allison Bay, and respectfully recommended him to strike to the N. W. from Cape Shackelton, instead of looking for the Devil's Thumb.

"I also offered him the services of our entire party and boat, expressing our willingness and readiness to accompany him to the northward in his search for the Polaris, which services, to our great regret, he declined. Receiving from him his mail and despatches for you, I left the Tigress at two A. M., she immediately steaming to the westward to round Brown Island, and the Little Juniata stood in for her anchorage in front of Jensen's house. The people of the Tigress were all well, in good spirits, and enthusiastic as to their success, which we heartily wished them in spite of our own disappointment.

"At 8.40 A. M., having received on board the six hundred pounds of coal, left with Jensen on the 2d, and having received from him some seal blubber in case we ran out of coal, we got our anchor and steamed away, passing among the same islands and through the same channels as in going north, and, favored with fine weather and smooth sea, reached the ship without any mishap at eight P. M. to-day, and were warmly received and welcomed back by you and the other officers assembled at the gangway.

"It now remains for me to hope, in submitting this report to your consideration, that my conduct in the affair will meet with your approbation, and that though we were unsuccessful in the endeavor to find the Polaris or her people, no means were left untried that the nature of the difficulties met with and the limited ability of our boat would allow. I believe the Little Juniata to have accomplished more than was expected

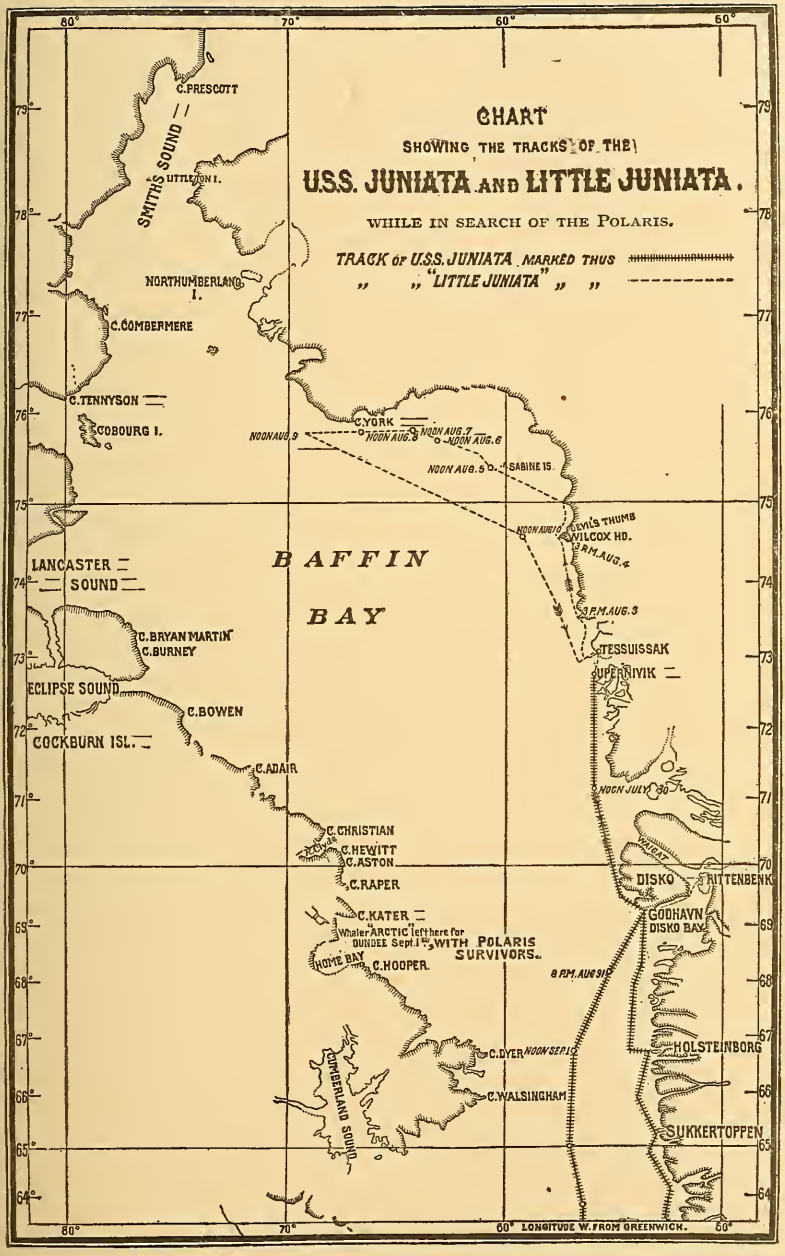


CHART
SHOWING THE TRACKS OF THE
U.S.S. JUNIATA AND LITTLE JUNIATA.
WHILE IN SEARCH OF THE POLARIS.
TRACK OF U.S.S. JUNIATA MARKED THUS
" " "LITTLE JUNIATA" " "
C. PRESCOTT
SMITHS SOUND
UTTLETON I.
NORTHUMBERLAND I.
C. COMBERMERE
C. TENNYSON
COBOURG I.
C. YORK
NOON AUG. 9
NOON AUG. 8
NOON AUG. 7
NOON AUG. 6
NOON AUG. 5
SABINE IS.
DEVILS THUMB
WILCOX HD.
NOON AUG. 10
P.M. AUG. 4
P.M. AUG. 3
BAFFIN BAY
LANCASTER SOUND
C. BRYAN MARTIN
C. BURNEY
ECLIPSE SOUND
C. BOWEN
COCKBURN ISL.
C. ADAIR
TESSUISSAK
UPERNIVIK
NOON JULY 30
C. CHRISTIAN
NOON AUG. 28
C. HEWITT
C. ASTON
C. RAPER
WHALE
DISKO
RITTENBENK
GODHAVN
DISKO BAY
C. KATER
Whaler ARCTIC left here for DUNDEE Sept. 1st
WITH POLARIS SURVIVORS.
HOME BAY
C. HOOPER
8 P.M. AUG 31
C. DYER
NOON SEPT. 1
HOLSTEINBORG
CUMBERLAND SOUND
C. WALSINGHAM
SUKKERTOPPEN
80°
70°
60°
LONGITUDE W. FROM GREENWICH.
79°
78°
77°
76°
75°
74°
73°
72°
71°
70°
69°
68°
67°
66°
65°
64°

of her in reaching the parallel of 75° 52′ N., there successfully working through a gale of great violence, and running nearly seven hundred miles while away from the ship. With the limited chances for keeping a reckoning, owing to thick foggy weather, and the constant discomfort of being in wet clothing, with every article in the boat drenched by the rains, or by the waves breaking over her, I fear that this report will not prove as satisfactory for navigation purposes hereafter as would be desired. I have made this report to you in detail, omitting no circumstance, however slight, that a fair, general idea might be obtained of the circumstances of Arctic navigation in an open boat, even at this the most favorable season of the year.

. . . . . .

"Throughout this trip the officers and men worked alike, and fared alike, and as we are unanimous in our regret that as far as finding and relieving the Polaris was concerned we failed, we beg to assure you we are of one voice in volunteering for any subsequent expedition from this ship or from the United States, in which our efforts can be made useful, or our experience in the Little Juniata of any effect.

"I cannot close this report without commenting upon the great interest taken in the matter by yourself, the provision made for our comfort, and your thoughtful care that nothing should be wanting to insure our safety and the success of the expedition.

"I have the honor to be, Captain,

"Very respectfully, your obedient servant,

"GEORGE W. DE LONG, *Lieutenant U. S. Navy*,

"*Late commanding Little Juniata.*"

During the absence of the Little Juniata, Captain Braine had met the Tigress, and been greatly alarmed by the representations made by the captain and ice-pilot. The Danes and Esquimaux, also, at the settlement, expressed the gravest fears for the safety of Lieutenant De Long and his party, and it was with intense relief that Captain Braine welcomed the Little

Juniata back. Captain Markham, who was on the last English expedition under Sir George Nares, considered this boat journey as one of the most hazardous and venturesome undertakings he had ever known. Men to save their own lives will take such risks, but they rarely court them to save others. Melville Bay is renowned for its dangers, and whole fleets of whalers have been crushed in the ice which crowds it.

The following letter, which Lieutenant De Long wrote to his wife after the expedition, gives in more familiar form some of the impressions which his experience left upon him.

U. S. S. JUNIATA, GODHAVN, DISCO ISLAND, GREENLAND, *August* 19, 1873.

I presume there will be no question as to our having tried our best to find the Polaris, and as to our having tried every means to accomplish it, but it was a physical impossibility to drive our boat through ice four feet in thickness, and so we were compelled to turn back. I made a long report of the expedition covering twenty-three pages of official paper, and of course I cannot give you such a complete description of it in one letter. However, there were some things which I did not include in my report, and these things I can write you, and you can know they were reserved for your reading first.

In the first place, I am thankful to God for having spared me to come back to you again, for I assure you I felt pretty well convinced on two occasions that I was going to leave the bones of our party in the ice. It was, to say the least of it, a perilous journey, and our experiences of the ten days are things which I shall remember for the rest of my life. There rested on my shoulders the fearful responsibility of saying how far we should go, and how far the lives of our little party were to be jeopardized; and surrounded as we were by dangerous circumstances, I had an amount of care on my mind that I do not desire to have again for such a length of time even as ten days. Our boat, to begin with, was a small one,

UPERNAVIK.

and we were loaded down with coal and what provisions we should require. The great object was to carry coal so that we might be able to steam, and we filled up every available nook and corner with that precious article. We had to sleep upon coal, and that made a hard bed, I assure you; and when you add to that the fact that we were wet to the skin almost from the time of our start, with our blankets soaking always, you can understand that we had very little comfort and less rest. We had eight in our party, and kept watch and watch, of course, and in bad weather all hands had to be around. Cooped up in a small space, there could be no distinction made between officers and men, and we turned in and out with each other.

I cannot give you any very accurate idea of our trip without writing a fearfully long letter, and so I will only refer to the leading incidents. About one hundred and twenty miles to the northward of Upernavik we were caught in the ice. Now, being caught in the ice means starving to death or being frozen to death, if you have to stay there. We got caught in it by accident, for we were following a lead in the ice when a thick fog shut in and new ice commenced forming around us. On attempting to work back the way we had come, we missed our track and were brought up standing. Such a night of anxiety I hope never to have again. We were fast, ice was making around us and thickening all the time; nothing to be seen for miles but ice. Mr. Dodge, who had spent a long time in this part of the world, shook his head rather dubiously. Still, I was not disposed to give up without a fight. We kept ramming the ice all the time, trying to drive through it, running into every little crack we made, grinding and scraping, trying to break through ahead of the boat, so as to make a clearance. Sometimes we would get into a narrow lane of water and run along nicely for a hundred feet or so, and then bang! we were again at a stand-still. This continued for twelve hours, and finally we got clear.

Our next mishap was getting in a gale of wind when about eight miles from Cape York. We had been on the edge of the ice-pack looking for an opening, in a thick fog, when this

gale came on, and for thirty hours we were, without doubt, on the brink of eternity. The boat was nearly all the time buried by the sea, she was half full of water, we were surrounded by icebergs a hundred feet at least in height. The broken pieces of ice were being hurled like stones on the face of this ice-pack and ground to powder, or else thrown over and over like lava from a volcano. Had we struck this ice, our chances would have been slim, — in fact, I would rather have been in the worst surf that exists than have been thrown up against this terrible wall. Looking back at it now makes me tremble, and I can only say that it was a miracle of Divine Providence that we were saved. When the gale broke we were in a pitiable condition — hungry, cold, and wet, not a dry thing in the boat. The ice was all heaped up between us and Cape York, and getting through it was an impossibility. Our coal was nearly all gone, and we had yet to get back to the ship. I had to decide to return, and had we not been favored by a breeze, we would not have reached here yet. As it was, when we met the Tigress we were burning pork in the furnace to get into Tessi-Ussak.

Captain Braine and all hands seemed overjoyed to get us back. It appeared when the Tigress met the Juniata at Upernavik, Captain Tyson, who was one of the survivors picked up on the ice-floe, expressed the opinion that we were as good as lost if we met any bad weather, and that set everybody to thinking very seriously how perilous a journey we had undertaken. What the people on board the Tigress could not understand was my volunteering for the expedition, and many sad shakes of the head and sayings of "Poor De Long" showed how little they expected to see me back. When the Juniata sighted us returning, the ship was wild with excitement, the men manning the rigging and cheering us until we came alongside. When I stepped over the side so buried in furs as to be almost invisible, they made as much fuss over me as if I had risen from the dead, and when the captain shook hands with me, he was trembling from head to foot.

The Juniata returned to St. John's, Newfoundland,

without having gained any further intelligence of the Polaris, and although it was September, Captain Braine received orders to return to Greenland, on the same errand. The ship had just started when a telegram reached the United States consul, countermanding the Juniata's sailing orders, since the Polaris' crew had been picked up and rescued by the whaler Arctic, Captain Adams, and had been taken to Scotland. The consul hired a tug, steamed after the Juniata, overtook her, and communicated the pleasant tidings. The vessel shortly after returned to New York, and Lieutenant De Long wrote to the Department tendering his services in event of another Arctic expedition. His indomitable energy, strong will, and passion for overcoming obstacles, all tended to develop in him that Arctic fever, which so often fastens upon one who has once known the excitement, difficulty, and peril of northern exploration.

The courage and persistence which he showed upon the boat journey were credentials of great value, and the personal attraction which he exerted was to be a powerful aid in overcoming obstacles. These qualities will appear in the fuller narrative of his experience in his great voyage, although, since the narrative is from his own hand, the reader may sometimes fail to measure the degree of his heroism. Something of his power of endurance may be learned from a little incident which befell him a few years after the events just related.

It was when he was executive officer of the School Ship St. Mary's, and was working the ship up the Tagus River, Portugal. He was standing on a horse-block (a slight elevation on each side of the deck) when a rope fell from aloft. Fearing it might injure a stand-

ing compass, which it probably would strike on its descent, he sprang to catch it, and instead of alighting on the deck as he expected, he came down on a coil of rope, and turned his right ankle under him. The pain was excruciating, and as he was on the point of fainting, he went below, where the doctor revived him, and he returned again to the deck. It was ten in the morning when the accident occurred, and he stood and worked the ship up the river to Lisbon until four in the afternoon, when his agony became so intense that he was obliged to go below. His duty was done, however. The doctor examined his foot and found it in a dreadful condition. One of the bones of the ankle was broken, and the edges had been grating and breaking for the six hours he had been walking about on it. The hot climate of Lisbon and of the return trip were naturally unfavorable to a rapid recovery, but the perfect health and vigorous constitution, which he had kept unimpaired, were his allies, and he was left with no stiffness of the ankle and no ill effects. He attended to his duty as usual after two weeks' rest, and the carpenter, Nindemann, made for him a pair of crutches, upon which he hobbled about and took his watch as if nothing had happened.

The courage and endurance which he displayed under difficulties and trials were qualities of a nature which was superabundant in joyousness and activity. His adventures at sea and on land were full of incident, and often offered the most amusing situations. While in Lisbon, in 1867, a grand performance at the Opera was to take place. The king and queen, the court, and all the officers off duty of the various fleets lying in the harbor, were in attendance. Between the acts, Mr. De Long and several of his friends were introduced behind

the scenes. Seeing the prima donna come upon the stage from an opposite wing, Mr. De Long picked up a large pasteboard bouquet, which was one of the stage properties, and marshaling his friends in a line behind him, advanced to meet her. She made some motions which he failed to understand, and with his hand upon his heart and his best bow he tendered the gigantic bouquet. Just then a perfect shout went up from the audience, and cries of "De Long! De Long!" were heard. He looked around in bewilderment before he took in the situation. His friends had abandoned him, the curtain had gone up, and he was playing his little piece before the great audience. It is scarcely necessary to add that he made his exit without the slightest ceremony.

Another amusing incident in Lisbon arose out of a wager between Mr. De Long and another officer as to who could do the most with a horse in a circus ring. Neither gentleman was a horseman; what sailor is? but they were equally bold. Their first proposal was to ride standing upon a pad, but the ring-master to whom they applied would not give his consent. He had once granted such a request for a similar purpose, and brought upon himself a severe rebuke when one of the parties, a young German nobleman, was seriously injured. He would give the officers each a saddled horse, and let them test their horsemanship to their hearts' content. So they went through various evolutions equally well, and jumped some low hurdles, but neither could be proved to have outdone the other. Finally the ring-master stepped forward and said: —

"There is but one thing more I can suggest to decide the wager, and that is for each in succession to ride into the stable, take a turn round, come down the

inclined plane, and jump over this five-barred gate into the ring."

This was agreed to. Mr. De Long's companion, being senior in rank, was to make the first attempt. He made his turn of the stable, came down the inclined plane, took the gate, and landed gracefully in the sawdust a few feet in advance of his horse. When Mr. De Long's turn came, he resolved to die or conquer. He rode round the stable, came down the inclined plane at a gallop, tightened his knees against the horse's flanks, and shut his eyes. To use his own words: "When the horse sprang for the leap it seemed as if I had started for the sky. I shut my eyes tight, and my next sensation was that of being struck by an earthquake. When the animal landed in the ring, I was clutching hold of his mane frantically; and when I opened my eyes, I was away up the horse's neck, almost on his ears, but I was there, and the wager was decided in my favor."

In his intercourse with his associates, and especially with the men and boys under his command, he showed an unfailing courtesy and kindness, while he was inexorable in his maintenance of discipline. A slight instance of his kindness is shown in the following incident. One rough, cold and windy October night, he was sailing a boat in Long Island Sound with a crew of St. Mary's boys. Noting that one of them had become wet from salt-water washing over him, Mr. De Long quickly took off his own coat and handed it to the boy, telling him to put it on. The lad hesitated at accepting such a sacrifice from his officer, but the stern command, "Do as you are bid, young man," soon caused the boy to obey.

"I can only say," Mr. De Long once wrote, "that with men I never allow any argument. Were officers

and men to argue each order before carrying it into execution, there would be an end to discipline. I never ask a man to do anything that I would not do myself, and on one occasion I led them aloft when they hesitated to obey an order on the score of danger. With firmness I can yet be kind, and I always had my men contented and comfortable. I have no hesitation in saying that I believe any men who have sailed with me would go willingly again."

One of his associates on the St. Mary's, recalling that earlier experience, has written : —

"A few days after the appearance of the newspaper notice of Lieutenant De Long's orders to the New York Nautical School Ship St. Mary's, one of the inquisitive marine aspirants remarked to one of his chums, 'I wonder what sort of a chap that fellow De Long is who is coming here?'

"He soon learned that 'that fellow De Long' was a perfect master of the situation, always equal to the various and often trying emergencies at sea and in port. His courtesy to all and interest in the boys took away the hardness of his rigid discipline.

"When questioned by a reporter, 'Are the officers kind to you?' a lad of fifteen replied, 'They are as kind as they can be, and when we were at sea they treated us better than when we were near land. We liked them for that. There's Captain Phythian, and Wadleigh, and De Long, and all of them; they are as nice as they make them.'

"From that estimate to the high tribute which the graduates and members of the Nautical School have recently paid to the memory of De Long, no moment is wanting when he has not been looked up to and honored as a man not only of rare heroism but of eminent fitness for the works he has been selected to perform."

CHAPTER II.

PREPARATIONS FOR THE EXPEDITION.

Conversation with Mr. Grinnell. — Proposal to Mr. Bennett. — Mr. Bennett's Response. — Delay in Plans. — Search for a Suitable Vessel. — Purchase of the Pandora. — Sketch of Operations. — Dr. Petermann's Views. — Lieutenant De Long repairs to England. — Balloon Ascensions. — The Pandora renamed the Jeannette. — Lieutenant Danenhower joins the Ship. — the Voyage to San Francisco. — Action of Congress. — Survey of the Ship. — Interview with Secretary of the Navy. — Alterations of the Jeannette. — Considerations of Economy. — Captain De Long's Labors. — The Officers of the Party. — The Crew. — Advice from Outsiders. — Orders for the Expedition. — Mr. Bennett's Farewell. — Outlook.

When the Juniata was ordered to the coast of Greenland, Lieutenant De Long called upon Mr. Henry Grinnell, of New York, to obtain from him any information which his long connection with Arctic explorations could afford. Mr. Grinnell offered the use of charts which had been employed on the several expeditions he had fitted out, and upon the return of the Juniata Lieutenant De Long restored these charts to Mr. Grinnell, and acquainted him with his own experience. The two held a long talk upon Arctic subjects, and shortly after Lieutenant De Long dined at Mr. Grinnell's in company with Dr. Bessells and other Arctic voyagers. At this dinner Mr. De Long asked Mr. Grinnell: —

"Why do you not fit out an expedition to the North Pole? I should like much to take command of one and solve the problem. You have tried so often you ought to try again."

"I am too old a man," replied Mr. Grinnell, "and I have done my share. Younger men must take the matter in hand. There is Mr. James Gordon Bennett. He is the man to undertake such an expedition. You should apply to him."

It was the first day of November, 1873, when this conversation occurred, and Mr. De Long acted promptly on the hint, and wrote to Mr. Bennett, who was then in Paris. Mr. Bennett had already considered such an expedition, and made a courteous reply, but upon his return to this country early in 1874, a personal interview with his correspondent convinced him at once that the most important element in the expedition, the man to command, was found. Mr. De Long in his letter had named Lieutenant Chipp, his companion on the Little Juniata, as one whom he should like to have associated with him, and from the first Mr. Bennett regarded him as Mr. De Long's right hand man.

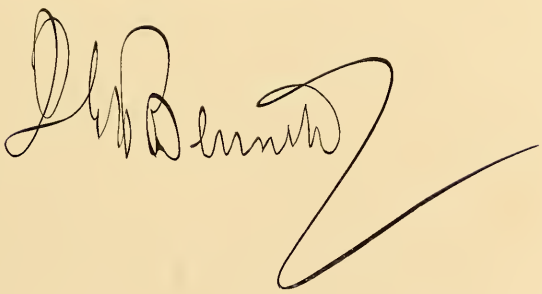
The matter rested until near the end of November, 1876. There had been, it will be remembered, some complications with Spain which at one time made war seem possible, and it was inexpedient to consider the expedition under such circumstances. Mr. De Long was detached from the Juniata in January, 1874, and ordered to the Brooklyn, with which he remained till near the end of the year, when he was transferred to the Nautical School Ship St. Mary's, which was commissioned by the United States Navy, but was under the supervision of the Board of Education of New York city.

In November, 1876, Mr. Bennett and Lieutenant De Long resumed their consideration of the expedition, and it was determined to look for a vessel with all possible dispatch, and to start for the North Pole the fol-

lowing summer. Inquiries were made in all available quarters for an American vessel, but none could be found; and in December Lieutenant De Long obtained a two months' leave of absence from the St. Mary's and went to England on the same errand. It was expected that Mr. Bennett would join him shortly, but he was detained in America until just before the expiration of Lieutenant De Long's leave of absence, when he joined him in London.

Meanwhile Lieutenant De Long personally, and through confidential agents, was employed in diligent search for a vessel. Special effort was made at the northern ports from which sealers and whalers were sent out, and he was constantly examining such vessels as seemed to give promise of fitness, but the difficulties seemed to increase. Poor vessels were offered at high prices; good ships the owners would not sell, as whalebone was so high that one cruise to the Arctic more than paid the first cost of a vessel. The only suitable one which seemed to be in the market was the Pandora, owned by Sir Allen Young who used her as a pleasure yacht in trips to the Arctic regions. Sir Allen was indifferent to the sale, and the purchase had not been effected when Mr. Bennett arrived in London. Mr. Bennett wished Lieutenant De Long to ask an extension of his leave of absence, but this would have worked, at the time, so much injustice to the officers of the St. Mary's that Lieutenant De Long refused to make the application and returned to America.

During the season that followed a constant and vigilant watch was kept up, but the Pandora continued to be by far the most available vessel. Sir Allen himself was an explorer of note. He was with Admiral McClintock when the first records of the Franklin expedi-



tion were found, and had made a number of subsequent voyages. The Pandora was a vessel in which he took great pride, as he had purchased her expressly for Arctic expeditions, and had tested her well on such voyages. He parted with the vessel to Mr. Bennett under a sudden impulse, and then regretted his loss so keenly that even after the vessel was ready for sea he made ineffectual efforts to recover her.

Lieutenant De Long was attached to the St. Mary's in New York harbor, as executive officer, when he received news of the purchase of the Pandora. He immediately resigned his position and secured a six months' leave of absence. Pending further word from Mr. Bennett, he wrote him at length, January 25, 1878, giving his views of the course to be pursued, and the letter is interesting as showing the comprehensiveness of the plans which he formed and the promptness with which he acted: —

"Since receipt of information on the 17th inst., that you had purchased the Pandora, I have been momentarily expecting a summons to join you in England. Acting upon your notification to get six months' leave immediately, I secured the necessary permission from the Department upon tendering my resignation as executive officer of the St. Mary's. Obtaining a leave of absence for a second time from that vessel was, as I had previously informed you, out of the question. By dint of extraordinary exertion I secured my release within forty-eight hours of my knowing you wished me to get six months' leave, and I have since that time remained with trunks packed ready to sail. . . .

"There are three ways for us to send the expedition, Smith's Sound, Behring Strait and east coast of Greenland. Of the three I am in favor of Behring Strait, though something can be said in behalf of the east coast of Greenland. Professor Nordenskjöld has received some information from

our Hydrographic Office in relation to Behring Strait, and a copy of this information will be furnished us. We may be able to accomplish much by way of Behring Strait by leaving San Francisco as late as July 1st, but I would like to be ready by June 1st or 10th. My opinion may be changed by what you have heard from Dr. Petermann, but as you have not told me what that was I cannot say now.

"Now I wish to submit the following points to you for your action. It is highly important that I should be in England to see the Pandora repaired, and got ready for sea. A small omission now may cost us the success of the expedition in the end. Chipp should be recalled from China by cable at once, and if you think favorably of my suggestions, be ordered to take the Pandora around the Horn. Upon the passage of the bill transferring the ship to the American flag, there should be a measure introduced and put through Congress, authorizing the vessel to be commanded and officered partially or entirely by naval officers, the pennant of a national vessel hoisted at the main, the crew shipped subject to naval rules and discipline, and the President empowered to confer such additional authority upon the commanding officer as will render him able in his isolated position to enforce discipline in extreme emergencies. Then I want an order from the President in something like the following words: 'You are hereby ordered to command the expedition now being prepared and fitted out by James Gordon Bennett, Esq., of New York, for the purpose of North Polar explorations; and you will report to the Secretary of the Navy for said duty and for such detailed assistance as you require.'

"The assistance of the Treasury Department should be invoked to order its agent in Alaska to provide seal-skin clothing for about thirty-five people, in height from five and a half to six feet, and to secure say forty dogs, and to collect, if possible, about one hundred tons of coal. The use of the San Francisco navy yard and dry dock should be asked for. The memorial to Congress should ask that the different departments of the Government be authorized to aid and assist us in every way; to provide us with all instruments and appurte-

nances, stores and outfits, which might then be in government possession."

This letter also contained estimates of the expense of the expedition on a three years' cruise.

The reference to Mr. Bennett's correspondence with Dr. Petermann recalls an earlier visit to the German geographer which Mr. Bennett had made in March, 1877, and of which he wrote to Lieutenant De Long: —

"I have just returned from a hurried trip to Gotha, on a visit to Dr. Petermann. You have no doubt heard of him by reputation. It was he who originated the two German Arctic expeditions. I can assure you the three hours I spent with him fully repaid me the tiresome trip to Gotha. He told me he had been studying the North Pole problem for the last thirty years, and that he feels certain it can be reached, but never, he said, by Smith's Sound or Baffin's Bay. He agreed with me that the English held to this route simply from pride, and because they were the first (so to say) to go that way. He also agreed with me, and if I remember correctly, it is your theory also, that the Pole can only be reached by a dash, and he even goes further than we do in this theory, for he says it can be done in one summer, and that with a suitable vessel and commander experienced in ice navigation, he would himself try the experiment for a three months' cruise. Of course, this bars being nipped in the ice, just as his doctorship would be about preparing to return on his homeward voyage. He also said that all the authorities in England agree now that the Pole will never be reached by sledges. Dr. Petermann even goes so far as to say that wintering in the Arctic regions is a mistake if you can in any way help it, and that if his route were taken it could be reached in the three summer months, or not at all. Said he: 'From all my information, I find that it is the second winter, and not the first, men most suffer in the Arctic regions, and strange as it may appear, men from southern climes, such as Italians or Greeks, have

withstood the rigors of an Arctic winter better than Northmen, such as Danes and Swedes.' I have been seriously thinking of getting another vessel in addition to the one you will have, and starting myself by Dr. Petermann's route. Of course, if I did so I should expect to be out all winter, as I don't quite agree with the Doctor about his three months' idea."

Not long after dispatching his letter Lieutenant De Long crossed to England to superintend the preparation of the Pandora, since renamed the Jeannette, for the Arctic expedition. He visited the yacht at Southampton as soon as he arrived, and after careful examination telegraphed to Mr. Bennett, who was in Leicestershire, that it would be impossible to repair the Jeannette and get her ready for sea early enough to permit the expedition to start that year for the north by Behring Strait, though it would be possible to go either by the Spitzbergen route or by the east coast of Greenland. The Behring Strait route, however, had by this time become firmly fixed in the minds both of Mr. Bennett and of Lieutenant De Long, and it was determined, therefore, to proceed with the repairs of the Jeannette, to send her round the Horn to San Francisco, and be ready to start for the north early in the summer of 1879.

The reasons which determined the course of the exploration, besides the failures from other points, were, in brief, the existence of the Japan current, flowing through Behring Strait to the north, and the supposed extent of Wrangel Land. It was hoped that the warm waters of the current would open a way, possibly to the Pole. The experience of whalers was that whenever they had been obliged to abandon their vessels in those regions, the vessels had been drifted northward, and the inference was that the currents generally

flowed in that direction. This would help explorers to make a high latitude, though it would, for the same reason, increase the difficulties of return. On the supposition that Wrangel Land, now known to be a small island, was a vast continental tract, it was expected that the Jeannette, in accordance with settled principles of Polar exploration, would follow its coast line to the north. When the vessel could work no further, sledge expeditions were to start out along the ice-foot to make a still higher latitude. Dr. Petermann, indeed, supposed Wrangel Land to stretch across the Pole and to reappear as Greenland of the Western continent. Added to these considerations was the comparative novelty of this course, which would render the expedition fruitful in observation and discovery, even if it failed of its main object.

Among the schemes which were brought forward in connection with this, as with other Arctic expeditions, was that of balloon ascensions, and though in the imperfect state of the aeronautic art, even under the best conditions, there seemed to be little chance of any practicable use of balloons in the Polar regions, both Mr. Bennett and Lieutenant De Long made the most careful and thorough examination of the subject before finally relinquishing the scheme. Mr. Bennett's secretary in England, writing to Lieutenant De Long on the subject, says : —

"I have written to Paris to inquire concerning the balloon material, etc., as you request. Markham and Hull were not much inclined to put any faith in balloons. Markham said he would consider an exploration by that method as simple madness, as the balloonist would be unable to carry with him the means of returning, and would be certain to perish before he could get back. As a means of making observations from a

height above the vessel or its vicinity, he thought a captive balloon might be useful if not too difficult to carry and inflate. He did not think it would be of the slightest service in sledging."

In response to the inquiry made in Paris, a report was obtained from the eminent French aeronaut, M. Wilfrid de Fonvielle, as to the best manner of preparing balloons for use in the Polar regions; and as a contribution to science, a translation of the report is printed in Appendix A.

The subject had first been broached by Lieutenant De Long to Mr. Bennett, and upon receiving the above he replied: "In writing to you on the subject of balloons I did not intend to convey the impression that I favored balloons as a means of getting to the Pole. I believe in them for but one object, and that is to get an increased height above a ship to command a larger horizon. A favorable occasion may be waited for, and one ascension may save many days' weary work in a wrong direction." He wrote also to Mr. Samuel A. King, the aeronaut: "Will you be kind enough to take into consideration the subject of an Arctic balloon? I desire, if possible, to employ a balloon (with a rope attaching it to the ship) for the purpose of commanding a greater view in order to select water channels for my vessel; and to have the lifting power applied to sledges and their loads to lessen the difficulty of dragging them over floes and hummocks." The result of inquiries is contained in a subsequent letter from Lieutenant De Long to Mr. Bennett: —

"I have had a long and interesting interview with Professor King, the 'balloonist,' and I am forced to the conclusion that we cannot do anything with balloons in Arctic explorations. To support a weight of one hundred and eighty pounds human

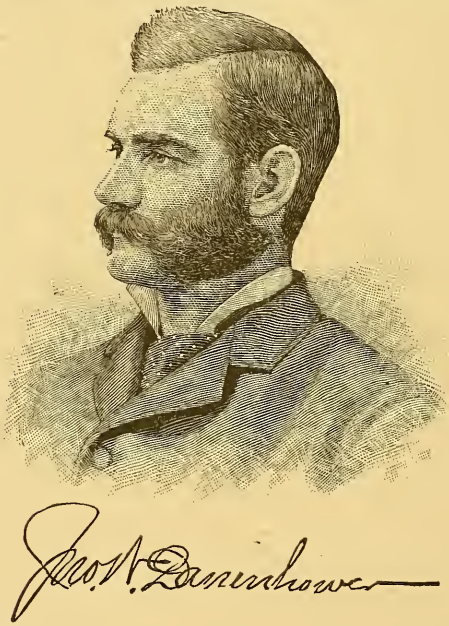
flesh (my own weight), and say seventy pounds rope, at a height of one hundred and fifty feet, would require a balloon about twenty-two feet in diameter, according to Professor King. To fill this enormous machine requires gas generated from coal, or gas generated from the action of sulphuric acid on iron cuttings: in the first manner we should require a coal mine near at hand, and in the second manner we should need another ship to carry the sulphuric acid and iron cuttings. The second plan is of course impracticable, and the first would come in merely in case we strike a vein of coal in Kellett (or Wrangel) Land. The cost of a balloon would be between seven hundred and eight hundred dollars, and under the circumstances I cannot recommend you to adopt it on either the score of usefulness or economy. While we were digging out coal enough to float the balloon, we might advance twenty-five miles with sledges, or afoot, and reach the extreme horizon to be seen from the prospective elevation."

No incidental interests of this kind could compare with the importance attaching to the condition of the Jeannette herself, and the commander was unremitting in his attention to the preparations made in the spring and early summer of 1878, when the vessel lay in the shipyard at Deptford. Everything was done which his own experience and that of professional surveyors could suggest for the repair and strengthening of a vessel already well built and equipped for Arctic voyages.

The Jeannette was finally ready for sea, and was taken to Cowes, where she shipped her crew and then crossed the channel to Havre, where she arrived June 18, 1878. She lay at Havre for a month, during which time she was inspected by many visitors, and the commander completed his equipment of charts, books, and stores. On the 4th of July the vessel was formally christened. Mr. Bennett sailed for New York on the

6th, and the Jeannette accompanied him a short distance on his way and then returned to the basin, leaving Havre for San Francisco July 15, 1878.

Captain De Long was in command, and had with him his wife and child. Master John W. Danenhower went with him as executive officer. He had been attached to the U. S. Steamer Vandalia, which was conveying General Grant and his party from port to port in the Mediterranean. The Vandalia was stationed at Smyrna when the news came of the proposed expedition, and



Mr. Danenhower offered his services to Mr. Bennett. General Grant seconded his application, and Mr. Bennett accepted him, provided Captain De Long should give his consent, which he did. Mr. Danenhower was detached from the Vandalia and joined Captain De Long in Havre just before the Jeannette sailed.

Two of the ship's company, John Cole, boatswain,

and Alfred Sweetman, carpenter, were also of the number who went to the north. They had served on Mr. Bennett's yachts, and the former especially received the highest praise from him. "You will find Jack Cole," he writes, "one of the best sailors you ever have had under you. In times of danger he 's worth his weight in gold, and his tact with men is wonderful."

The voyage to San Francisco was a hundred and sixty-five days, and during the passage not one from the ship set foot ashore, though the Jeannette anchored three times in different bays of the Straits of Magellan. One little incident of the voyage may be recorded. When off the coast of Brazil, and a hundred miles from any land, two little birds flew on board the ship to rest; one was a tomtit and the other a field lark. They had evidently been blown off shore by a gale of wind. They showed no fear but refused to eat anything, though everything in the shape of grain which the ship contained was offered to them, and even some lively cheese, which might be a special inducement to insectivorous birds. They would take no nourishment at all, and the tomtit died of hunger and exhaustion. The steward, a Swiss, composed some verses upon his melancholy fate, and these, with the latitude and longitude, were put with the little tomtit into a bottle, which was addressed inside to the "New York Herald" and thrown overboard. It has not yet reached its destination. The field lark flew out of the cabin door, left open by accident, and could not be recovered. It flew off the ship and then made successive efforts to return, but its strength gave out and it sank at last into the water.

The voyage was a stormy one, and when nearing San Francisco the ship encountered a norther which

kept her from making port, as had been hoped, on Christmas. Two days later, December 27, 1878, the Jeannette shackled to a buoy at the Mare Island navy yard, in the bay of San Francisco, with just one bucketful of coal left on board.

A month later a bill was introduced into Congress which provided: "That the Secretary of the Navy be, and he is hereby, authorized to accept and take charge of, for the use of a North Polar Expedition by way of Behring Strait, the ship Jeannette, owned by James Gordon Bennett, and by him devoted to this purpose; that he may use, in fitting her for her voyage of exploration, any material he may have on hand proper for the purposes of an Arctic voyage; and that he is further authorized to enlist the necessary crew for the said vessel for 'special service,' their pay to be temporarily met from the pay of the navy, and to be paid or refunded by James Gordon Bennett to the Navy Department, under the order of the Secretary of the Navy and as he may require; the vessel to proceed on her voyage of exploration under the orders and instructions of the Navy Department; that the men so 'specially enlisted' as above shall be subject in all respects to the Articles of War and Navy Regulations and Discipline; and that all parts of the act approved March 18, 1878 [which gave authority to the Secretary to issue an American register and detail officers], inconsistent with the above, be and they are hereby repealed: provided that the Government of the United States is not to be held liable for any expenditure assumed, or to be incurred on account of said expedition." The terms of the act gave rise to some incidental questions regarding the material which the Secretary might employ, but in the main it was clearly

understood that Mr. Bennett was to meet all expenses, while the Government was to have all the authority.

Captain De Long was thus acting under the direction of the Secretary, while he was also Mr. Bennett's financial agent, and the situation called for the constant exercise of judgment, that the expedition might neither fail of anything that should make its equipment complete, nor be a source of needless expense to the generous patron. From the day when the Jeannette dropped anchor in the bay of San Francisco till the day, six months later, when she weighed anchor for her final voyage, the commander's care was incessant. His watchfulness was comprehensive and minute; no detail escaped him, and he laid his plans broadly and firmly. He had constant need to exercise tact and persistence, and devoted himself unweariedly to secure the best interests of the expedition.

His first concern was to see that the ship was in the best condition for the voyage. The Department had ordered an examination of the Jeannette by a Board of Survey, and on the 24th of January Captain De Long wrote a full report of their proceedings to Mr. Bennett, and added the result of his own careful and minute examination. His intimate knowledge of the ship, as she was when she left the hands of her former owner, and his acquaintance with the improvements then made, followed by his experience in bringing her round to San Francisco, enabled him to understand thoroughly what further was necessary to make her ready for her northern voyage. The final decision as to her outfit rested with the Secretary of the Navy, and Captain De Long suggested, therefore, that it would be expedient for him to consult with him before the final orders were given. He was accordingly ordered

to Washington by the Secretary, and the result of their conference appeared in a letter which Captain De Long wrote to Mr. Bennett from Washington, February 20, 1879.

"When the request was made to the Secretary to send for me to confer with him, he lost no time in doing so. I reached Washington on the 15th, and had a short interview with him on that date, and a long one on the 19th. Nothing could exceed the pleasure of my reception on both occasions. He expressed himself as personally and officially interested in the success of the expedition, and indicated his conviction that we had struck the gateway to the Pole. He assured me that as soon as the bill now before Congress should pass, authorizing him to assume charge of the expedition, nothing should be left undone which we desired to be done. Said he in substance: 'As soon as the bill passes I shall order you officially to the command, and then you shall have just what you want in your own fashion, shall have just as much and just as little work done as you desire, shall get what men you want, how and where you please, shall equip and prepare your expedition after your own designs, and shall, in fine, have all the aid the Navy Department can give you. When you sail I intend you to have the same power that is conferred upon admirals commanding fleets, with the addition of being absolute in your command and authority, holding your subordinates accountable to you, and yourself accountable to me. This expedition must succeed, and you shall be prepared and forearmed against all disaffection, insubordination, and disaster.'

"Surely nothing finer than this can be asked. The bill provides for using any material now on hand at the disposal of the Department."

It may be added to this that the Secretary's good will was doubtless reinforced by the contagious earnestness of his visitor. Secretary Thompson has since said, in a speech delivered at the Melville-Berry reception at the National Capital, September 23, 1882: —

"Mr. Bennett early suggested and urged on the Department that Lieutenant De Long should be assigned to the command of the expedition. The Navy Department would have been justified in not making the appointment, unless assured that De Long possessed the other qualifications, aside from professional ability, necessary to the discharge of such a duty. As regarded his professional skill, his brother officers in the navy bore universal attestation to that, and the Department was aware that in this respect he possessed all that was necessary. It did not take many interviews with De Long to tell that he was a man of courage, devotion, judgment, and will, and possessed all the qualities which fitted him for this duty. The other selections were necessarily made as the result of conferences with him, and the Department was more or less in a position to be guided by his views."

Captain De Long had a magnetic power which made him singularly successful in dealing with men and in carrying out the purposes which he conceived. He was always scrupulously considerate of the rights and privileges of others, and exceedingly careful of the personal relations which he held toward them. While absent in the east he wrote to Master Danenhower, who had been sent forward to Mare Island navy yard, where the Jeannette was being strengthened, and after detailing the nature of the work which had been ordered, concluded: —

"The foregoing will give you a general idea of the work already begun, and as likely to be in hand during your presence at Mare Island before my arrival. It is decided by the Secretary of the Navy that all materials are to be given by the yard, and merely the labor paid for. It is therefore necessary that we should so act that the cost of labor should not be alarming. . . . The labor being paid for by Mr. Bennett needs great consideration by us. . . .

"Upon your arrival at Mare Island, you will of course re-

port to the commandant, and in as delicate a manner as possible represent to him that you are come to aid in the work to be done on board the vessel, and to act in providing the money to be paid by Mr. Bennett for labor; and request his permission to ask the coöperation of the constructor, chief engineer, and equipment officer, in every way which may present itself for saving money. Then wait upon the three last named gentlemen and ask to be permitted to look at and after any work which may be going on, not as an interference with them, but as one going on the expedition, acquainted with the ship, knowing my views and desirous of giving information on various subjects, and with time enough to go into various small details, which they, in their great occupations with more important things, would not care to be bothered with, etc. Request also that they would indicate to you such methods of procedure as seem right and proper to carry out our views without infringing upon any etiquette whatever.

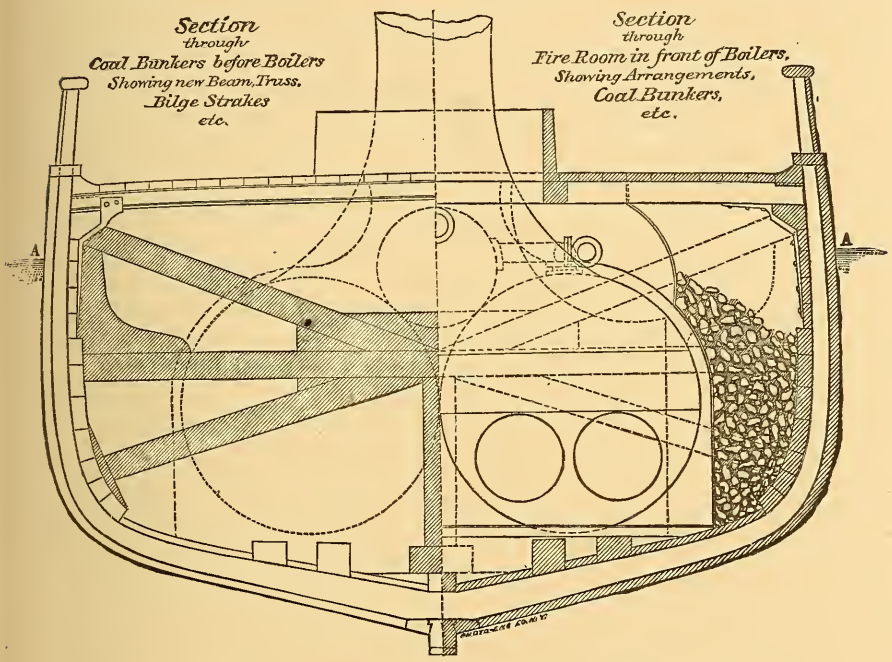
"As the work designated has been ordered done through the commandant by the various chiefs of bureaux, the laborers and workmen will, of course, be hired by the navy yard authorities. But should it seem to you that too many men are employed, or that any man so employed is idling his time, a proper representation to the head of the Department will no doubt have the necessary effect. This is a delicate affair, which I must leave to your tact and discretion, advising you simply that there can be no impropriety in any one's wishing to save money, and I do not see how it can be objected to. . . .

"I will now leave the matter in your hands, asking you to use your best tact and discretion to accomplish my wishes in a smooth way and to the benefit of the expedition. We are all interested in making the expense as small as possible, both to the Government and to Mr. Bennett, and there are many ways in which this can be done. The earnest coöperation of Mr. Fletcher and Mr. Much [officers connected with the yard] is promised, and they may point out to you many little economical plans."

How strongly Captain De Long felt the force of these instructions to Master Danenhower appears fur-

ther from a letter which he sent to Mr. Bennett at the same time, in which he writes: —

"Mr. Danenhower has started for San Francisco. I have given him the fullest directions as to his course of action, impressing upon him that the object of his stay there is to save as much money as possible. If I can have a copy made in



CROSS-SECTION OF THE JEANNETTE.

The water-line is at A.

time for this mail, I shall send you his instructions in detail for your inspection and I hope approval. It is not necessary, perhaps, for me at this moment to assure you that I consider your interest identical with my own, and that I am laboring to keep down expenses with as much zeal as if I were to foot the bills instead of you."

Again, a month later, when writing to Master Danenhower, he urged the same plea: "Will you and

Chipp take the matter of stripping the ship into advisement, and let me know your opinion with figures. It is such little items as three hundred dollars here and five hundred dollars there that run away with the money, and I am more careful about spending money belonging to Mr. Bennett than if it were my own."

The general result of the work done upon the ship is thus summed up in a letter to Mr. Bennett, written in the hard-earned leisure which came after the Jeannette left San Francisco : —

"Let me go back a little to tell you what had been done to the ship, and how I found things working at the navy yard when I reached it on the 30th of May. The repairs, or rather the alterations, were completed and the new boilers were in place. The bow had been filled in solid for a distance of ten feet from the stem, and for forty feet in length, and eight feet in depth amidships; the inside had been ceiled with oak planks six inches thick. Exactly amidships a very heavy system of kneed braces had been placed. An entirely new deck had been laid in place of so much of the old deck as was necessarily removed to hoist out the old sixteen foot boilers. The ship had been docked, caulked, and painted.[1] The house for the

[1] In another account of the work done to the ship, especially as regards its strengthening, Captain De Long adds: "A steam-winch has been placed on deck forward of the smoke-stack, capable of lifting the screw, unshipping the rudder, and warping the ship ahead. The bow has been heavily strengthened with oaken breast-hooks and transverse beams, and has been filled in solid and caulked below the berth deck for a distance of ten feet from the stem. Outside we have, of course, the original doubling of three and a half inch American elm extending fore and aft, and down to the floor heads, a distance of four feet nine inches from the keel. In the spaces occupied by the engines, boilers, and coal bunkers, for a distance of forty feet in length, and extending from the spar-deck shelf to the bilge strakes on either side, the old ceiling and wooden trusses have been removed, and six inch planks of Oregon pine in single lengths, with proper shifts, have been substituted. Just forward of the boilers there is a series of beams and braces to guard against dangers from severe nips, while the shape of the hull with its great dead-rise will serve to aid the ship in rising to pressure. The thickness of the vessel amidships is nineteen and a half inches. The frames are on an average twelve inches apart from centre to centre."

crew to live in in winter had been built, fitted in place, and taken apart and piled up. A portable observatory had been made, and winter porches for the cabin doors. New sails throughout had been cut and fitted, as well as an entire outfit of running rigging. Coal bunkers had been enlarged and new ones added, making her bunker capacity one hundred and thirty-two tons instead of eighty-nine tons as formerly. The new boilers were in place and connected. The machinery had been well overhauled; new pumps added; four new propeller blades cast, giving us at starting six blades, or the equivalent of three propellers; and an entire outfit of engineers' tools and stores placed on board. Chronometers, sextants, compasses, and charts were given; Remington rifles, revolvers, and ammunition were added; all the rope, canvas, and boatswain's stores were freely furnished; and, finally, all the carpenters' tools and outfit were thrown in. Everything that the navy yard had on hand was placed at our disposal, and the only things that I added to what had been already supplied were a new galley, navy pattern, bunks in the forecastle for the crew, and covering the inside of the forecastle and ward-room with felt. . . .

"Finally, however, all work came to an end, and the ship was turned over to me. I am perfectly satisfied with her. She is everything I want for the expedition, but a little small for all I want to carry in her. We must remember, however, we are making her do the work of an expedition that has heretofore generally required two ships. We have every appliance for all kinds of scientific experiments. Our outfit is simply perfect, whether for ice navigation, astronomical work, magnetic work, gravity experiments, or collections of Natural History. We have a good crew, good food, and a good ship, and I think we have the right kind of stuff to dare all that man can do."

The preparation of the Jeannette was under the supervision of Lieutenant Chipp and Master Danenhower. Captain De Long left San Francisco for Washington early in February, as we have seen, and did not return until the end of May. During that time he was ac-

tively employed in the countless details of his work. He was in constant communication with his officers at San Francisco, with the Department at Washington, and with Mr. Bennett in Europe. He followed every step of the work on the ship, using the greatest tact in removing the obstacles, some of them very serious, which frequently arose; he made the arrangements for the ship's stores and their transportation; he arranged for the choice of officers and other members of the expedition, and gave close attention to the selection of instruments for use in the scientific observations, and answered good-naturedly and promptly the numberless applications and inquiries which were made.

The choice of his companions was a matter of the greatest moment, and he was fortunate in having his wishes deferred to by the Government and by Mr. Bennett, who absolutely refused to make any appointment for friendship's sake, and supported Captain De Long in his determination to confine the party to those who were qualified for the arduous work of the enterprise. We have already spoken of Lieutenant Chipp and Master Danenhower. The friendship which sprang up between Captain De Long and Lieutenant Chipp during the boat expedition of 1873 was never interrupted; and the very earliest hopes which Captain De Long had of the Jeannette expedition were shared with his old comrade, who was then stationed in the Ashuelot at Fuh Chau, China, from which place he wrote June 21, 1877: "Many thanks for your assurance that if the expedition goes I shall go with it, and I will keep myself prepared at all times to join you upon the shortest notice. I regret that we have been disappointed in getting away this summer, but I sincerely trust we shall be more fortunate in 1878." He made his way to San

Francisco, as soon as he was detached from the squadron in the spring of 1879, and was cordially welcomed by Captain De Long, who wrote him from Washington, April 21, 1879: —

"I have not been able to write you sooner to say how glad I am to know that you are safely in San Francisco ready to join me in our Arctic work. You have, of course, learned from Danenhower the story of the expedition as far as it has got, and you cannot learn more of what I propose to do than by

J. M. AMBLER, M. D.

reading my instructions to Danenhower, and my letters to him since his arrival. Of course, as soon as the orders reach you, you will be the senior officer present at the ship, and the head of all operations until my arrival, which will be about May 15th. In order to keep things as simple and regular as possible, I would suggest and request that you leave in Danenhower's hands the completion of whatever work he has begun; and advise and direct him as to the best way to successfully carry out our plans. Melville goes out with all the latest details from the engineer-in-chief, and you and he will easily work together. We are so crowded with work that I cannot find time to go into details a second time, and so I ask that we

all confer and work together, comparing notes, one with the other. We are all working for a common good, the success of the expedition, and we must not stand on a little ceremony."

Passed Assistant Engineer George W. Melville was the chief engineer. He had been a comrade of Captain De Long's on the Lancaster, and was his first choice for the position which he filled. So highly was he regarded in the navy, that the Department was very reluctant to attach him to the Jeannette, from a sense of the extreme difficulty of supplying his place during

GEORGE W. MELVILLE, CHIEF ENGINEER U. S. N.

his absence. The surgeon was Passed Assistant Surgeon James M. Ambler. This post was one of great importance, and the duty of filling it suitably caused Captain De Long great concern. He was unwearied in his efforts to secure an officer who should combine the necessary qualifications, and at one time was strongly moved to invite two surgeons. Something of his concern, and something also of his appreciation, of Dr. Ambler's high qualities may be seen from a letter which he addressed to an applicant for the position in explanation of his course of action: —

"I owe and tender you an apology for my long silence, especially since you have written me your letter of March 24th. As you will be aware probably on the receipt of this letter, Passed Assistant Surgeon Ambler has been ordered to duty in the Jeannette.

"I beg to assure you that this is intended to be no reflection upon you, or disregard of your earnest desire and application to form one of the Arctic Expedition. The limited space for officers' accommodation on board the vessel has convinced me that it may not be possible to carry more than one medical officer. In this case it becomes imperatively necessary that the one medical officer so selected should combine a thorough knowledge of his profession (which you undoubtedly have) with a considerable experience of ships and sailors (which your short time in the service makes it no discredit to say you have not).

"Consultation with eminent medical officers in the navy has impressed me with the conviction that the combination above mentioned can be found best in the list of passed assistant surgeons, and I have caused the position to be tendered, through the Bureau of Medicine and Surgery, to Dr. Ambler, who has signified his acceptance.

"You will, I hope, understand and appreciate my motive. I am placed in a position of peculiarly grave responsibility. With all the respect which I have for you professionally, and the regard which I feel for you personally, I hesitated to invite you to become the only medical officer of the expedition, simply because your experience of ships and sailors is not as great as seems requisite in an undertaking of this kind.

"If, however, I find that there will be room for a second medical officer, that it will be wise to have one, and that you are still willing to go, be assured I will gladly tender you the place. I cannot forget and will not forget that you were the first surgeon to volunteer for the Arctic Expedition (and, until the present writing, the only surgeon to volunteer), and that you have showed a zeal and persistence under trying circumstances of watching and waiting too valuable to be lightly disregarded."

The ice-pilot was William Dunbar, of New London, Connecticut, who had been master of whaleships in and north of Behring Strait. The meteorologist was Jerome J. Collins, from the staff of the "New York Herald," a gentleman who at once commended himself to Captain De Long by his intelligent zeal, and his determination both to secure all proper equipment and to qualify himself for his special duties. In a letter

JEROME J. COLLINS.

written March 25, 1879, to Mr. Bennett, Captain De Long gave hearty testimony to the worth of his associate: —

"I am very much pleased with him. He has a large fund of general information, and will make a name for himself in the Arctic, I am sure. He has seemingly mastered photography already. I propose now to have him go to Washington, and I shall ask Professor Baird to give him the same facilities at the Smithsonian as were tendered to the medical officer when he should be selected. I shall make the same request of Admiral John Rodgers at the Observatory, and of Captain

Patterson at the Coast Survey Office, and by these hope to secure for Mr. Collins all the benefit of government institutions."

From that time forward Captain De Long and Mr. Collins worked together indefatigably to secure the scientific objects of the expedition.

The naturalist was Mr. Raymond L. Newcomb, of Salem, Mass. In the case of these last named members of the expedition a slight technical difficulty arose, as will be seen by the following letter from the Secretary of the Navy to Captain De Long, dated May 26, 1879: —

"Your letter of the 18th inst., requesting permission to appoint a meteorologist, naturalist, and ice-pilot, to accompany you on the proposed Arctic Expedition, is received. In reply you are informed that I do not think I have any authority to make these appointments, as they are civil and in no sense naval. The law gives me power to detail officers and enlist seamen. They are neither. If you choose to take them with you, all that I can do will be to give my consent, which I will do at any time. If they were mustered as seamen perhaps the object would be accomplished. It would, at all events, subject them to discipline." (See Appendix B.)

This course was followed, and they signed the papers and appeared on the roll as seamen, but the relation in which the meteorologist and naturalist stood to the officers is clearly set forth in Captain De Long's letter of explanation to Professor Baird of the Smithsonian Institution, in which he says: —

"The Secretary replied (to my application) that he had no authority to appoint these gentlemen under an Act of Congress, and suggested that, in order to bring them under naval regulations, I should ship them as seamen. This I have proposed to Mr. Newcomb purely as a matter of form, and he makes no objection. You will understand that in no other

sense will he be considered a seaman, but will be known and published as the 'Naturalist of the Arctic Expedition,' will reside and mess with the officers of the ship, and be one of my official family."

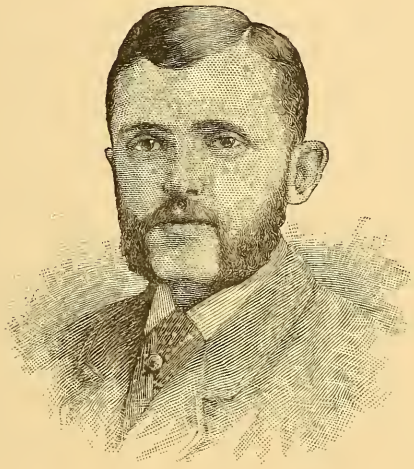
The crew was selected with great care, part in the East and part from the Pacific Coast.

"If I can get suitable men in San Francisco," Captain De Long writes to Lieutenant Chipp, to whom he had specially committed this matter, "I don't want to go to the expense of sending men from the East where I can get them in swarms. Requirements for crew: Single men; perfect health; considerable strength; perfect temperance; cheerfulness; ability to read and write English; prime seamen of course. A musician, if possible. Norwegians, Swedes, and Danes preferred. Avoid English, Scotch, and Irish. Refuse point blank French, Italians, and Spaniards. The steward must be A 1, and not necessarily a seaman. The cook must be a good cook, since he cooks for all hands. Look among recruits in receiving ship to begin with. Pay to be navy pay. Absolute and unhesitating obedience to every order, no matter what it may be. . . . Excuse my scratchy and jerky way of putting things, but I am wofully hurried." (See Appendix C.)

Lieutenant Chipp found it no easy matter to secure men, but Captain De Long received abundant applications from all quarters from persons who wished to join the expedition in some other capacity than that of common seamen. One determined young man, or rather boy, besieged him with letters, professing his readiness to do anything and everything if he might only be taken, and resting his special claims upon an ability to edit a newspaper and get up a variety show for the entertainment of the company during the long nights of an Arctic winter. Captain De Long's reply to his application was in substance that which he made to every one: "Your various letters have been re-

ceived. In reply I would state that I have room in the Jeannette for nobody but her officers and crew. These must be seamen or people with some claim to scientific usefulness, and from your letters I fail to learn that you may be classed with either party."

Mr. Bennett and Captain De Long received frequent advice and warnings with regard to the expedition.



Raymond Lee Newcomb

One theorist wrote solemnly that the explorers were on the verge of a great discovery before which the discovery of America by Columbus would pale, for they were to enter a region, about the 87th degree of latitude, where a tropical heat would meet them issuing from the hollow centre of the earth. Another was convinced of the feasibility of opening trans-oceanic communication for commercial purposes between the Pacific Coast and England *via* Behring Strait, the Arctic Ocean, Melville, Lancaster, and Davis Straits, and

Baffin's Bay. He thought the route would be an excellent one for a large freight business during the summer, and only required to be well surveyed and supplied with buoys and light-houses. A well-wisher of the expedition disclosed the valuable properties of cat-tails, which, when packed as a wadding between two cloths, made the most perfect non-conductor of heat possible.

A light-hearted friend of Captain De Long, and former messmate, had only one request to make, that the captain would carry a flute, very precious to the owner, as far as he should go. It was a flute, as the owner wrote, which, in the hands of Captain De Long, had once given exquisite gratification. "I am sure," he adds, "it only requires another course under you to become one of the most remarkable of instruments. If you play it anywhere near Ounalaska's shore, I am sure the wolves will all come down to howl, and thereby serve a good purpose if it should happen to be thick weather. Then, in the periods when the spirits of your men need rousing, what would be more appropriate than for their commander to appear at the mast and discourse those selections from 'Pinafore' upon the instrument of which he is a master?" Still another sent the captain a likeness of Captain Hall and a bit of the Polaris' flag to be carried to the North Pole.

The Jeannette was put in commission June 28, 1879, when the silk flag which his wife had made for Captain De Long was used. This flag was to be used in taking possession of any new found land in the name of the United States, and to be unfurled when the highest latitude was reached. The orders for the expedition were given by the Secretary of the Navy in a letter dated Washington, June 18, 1879, which, after reciting

the terms of the two Acts of March 18, 1878, and February 27, 1879, proceeds: —

"Under the authority conferred by these Acts of Congress, the Jeannette has been accepted, fitted out, officered, and manned under the orders of this Department, and you have been ordered to the command of the voyage of exploration.

"As soon as the Jeannette, under your command, is in all respects ready for sea, you will proceed with her to Behring Strait, to execute the important and hazardous service intrusted to you. In the execution of this service, the Department must leave the details to your experience, discretion, and judgment. It has full confidence in your ability in all matters connected with the safety and discipline of the ship, the health and comfort of the officers and crew, and the faithful prosecution of the object of the voyage.

"On reaching Behring Strait, you will make diligent inquiry at such points where you deem it likely that information can be obtained concerning the fate of Professor Nordenskjöld, as the Department has been unable to have positive confirmation of the reports of his safety. If you have good and sufficient reasons for believing that he is safe, you will proceed on your voyage toward the North Pole. If otherwise, you will pursue such course as, in your judgment, is necessary for his aid and relief.

"You will, as opportunity offers, advise the Department of your whereabouts, and of such matters of interest connected with the voyage as you may desire to communicate. Wishing you a prosperous voyage, and commending you, the officers and crew, and the object of your expedition, to the protecting care of Almighty God,

"I am very respectfully yours,

"R. W. THOMPSON,

"*Secretary of the Navy.*"

It was a severe disappointment to Captain De Long that the founder of the expedition was not to be in San Francisco to bid him God-speed. In the connection

between the two men there had been no jar or misunderstanding. On the one hand there had been the utmost liberality and confidence; on the other, the closest fidelity. As the time drew near for the expedition to start, and Captain De Long tried in vain to secure from Government a convoy to Behring Strait, he burst out in one of his despatches to Mr. Bennett's representative in New York: "Thank God, I have a man at my back to see me through when countries fail!" Mr. Ben-

WILLIAM DUNBAR.

nett's final instructions, sent by Atlantic cable from Europe and forwarded to Captain De Long, closed with these words: —

"Regret exceedingly I cannot be there to bid him God-speed, but hope to be on hand to congratulate him upon successful return. Tell him I have greatest confidence in his energy and pluck, and I thank him sincerely for his fidelity to me. Say, also, he may push forward to north next spring with perfect confidence, for if ice-bound, I shall spare neither money nor influence to follow him up and send assistance next year, so neither he nor his men will be in danger. I wish this to be

an American success. Tell him in case he returns next year unsuccessful, which I don't believe possible, I shall most certainly send another expedition following year, and continue doing so until successful, but had rather victory should be his than another's. Should De Long not return next year, or in fact never, the widows of men belonging to expedition will be protected by me. Should like him to tell this to his men upon their departure."

In the preparation for the expedition Captain De Long had drawn upon his own experience, and had applied a knowledge derived from long and close study of the details of previous Arctic voyages. His familiarity with naval duty was supplemented by an acquaintance with all the minutiæ of the expedition which he commanded. He had been generously supported by Mr. Bennett, and he had the authority of the Government behind him. His survey of the Jeannette and her equipment had left him satisfied with the result of the year's work; he had confidence in his associates. His only regret was that Mr. Bennett could not wish them God-speed in person, and that Government had failed to furnish him with a steamer to carry additional supplies to St. Michael's, for this failure would inevitably delay his final entrance into the Arctic Ocean.

Yet the completest preparation for the expedition was in Captain De Long himself. The sketch of his early career, and the glimpses of his character which this chapter has afforded, will give the reader some intimation of the singular qualifications which Captain De Long possessed for the work which he had undertaken. For years his mind had been turning to this point. His native enthusiasm and spirit had urged him, and his sense of a great work to be done had drawn him forward. The experience which he had known when in

command of the Little Juniata had given him a practical knowledge of some of the difficulties attendant upon Arctic exploration, and had assured him that he was not wanting in the qualities of an explorer. The more he pondered upon the problem of the North Pole, the greater became his desire to help in its solution, and if possible to give that answer which alone would satisfy the world. He was keyed to the temper of his great enterprise by no vainglorious purpose or rash self-confidence. He never disguised from himself the seriousness of the task he had essayed, nor imagined that he was to win a high reputation by some happy turn of fortune. He belonged to the men who have cared for great things, not to bring themselves honor, but because doing great things could alone satisfy their natures, and he entered upon the work before him with a single-minded earnestness, and a brave trust in God.

CHAPTER III.

FROM SAN FRANCISCO TO ST. LAWRENCE BAY.

8 *July* — 27 *August*, 1879.

The Start. — The Escort. — The Company. — Ounalaska Island. — The Alaska Commercial Company. — Letter to Secretary of the Navy. — Generosity of the Company and its Agent. — St. Michael's. — No Tidings of Nordenskjöld. — The Officers of the Jeannette. — Arrival of the Schooner Fanny A. Hyde. — The Character of the Crew. — The Arctic Stores of Clothing and Provisions. — The Interpreters. — Off for St. Lawrence Bay. — The Dogs. — St. Lawrence Bay. — The Chief George and his Story about a Ship. — Lutke's Island. — The Last of Civilization.

[THE story of the voyage of the Jeannette will be told in the words of the commander. Besides the ship's log he kept a full journal during the voyage, and continued the record after the ship was abandoned. It has been the task of the editor to reproduce the journal with such omissions and corrections only as its form, never intended for publication, seemed to demand. This journal was to be Lieutenant-Commander De Long's record of the expedition, but after leaving San Francisco, and before entering Behring Strait, he had opportunities of sending letters home, and the narrative preserved in this chapter is drawn by turns from his journal and from these letters.]

[FROM THE JOURNAL.]

Upon steaming out of the harbor of San Francisco the Jeannette was escorted by some half dozen yachts

belonging to the San Francisco Yacht Club, Commander C. H. Harrison leading them in his yacht Frolic; by the tug Mellen Griffith, hired by J. C. Morison, our shipping agent; by the tug Governor Irwin, carrying his Excellency Governor Irwin, of the State of California, who did us the honor to pay us a visit on board just before sailing, and a party of merchants; the tug Rabboni, with a large number of San Franciscans, and several small steam-launches loaded down with people. The wharves were crowded with enthusiastic friends; Telegraph Hill was black with people who had climbed up there to cheer us and wave adieux; and every ship we passed dipped her colors to us, while shouts, steam-whistles, and yachts' cannon shots kept the air filled with noise. Upon passing Fort Point a salute of twenty-one guns was fired in our honor, while the garrison of the fort cheered us enthusiastically. Astern of us might be seen our consort, the schooner Fanny A. Hyde, laden with one hundred tons coal and such provisions as we could not conveniently carry. The refusal of the Navy Department to send a man-of-war with us as far as Alaska to start us as favorably as was the Polaris, Captain Hall, in 1871, when the Congress was sent to Disco, in Greenland, to help her along, made the chartering of this schooner necessary at Mr. Bennett's expense. I may here add that not a sign of a naval officer was seen in the departing ovation. The Alaska, Tuscarora, and Alert lay at the navy yard, only twenty-six miles away; and though the navy yard tug Monterey lay at a wharf in San Francisco when we started, having brought the commandant down that morning, she made no move toward participation. On the contrary, when fifteen minutes later she left her wharf, she crossed our wake a mile astern without

even a blast of her steam-whistle as a good-by, and went off in the direction of the navy yard.

Arriving at the Sea Buoy we parted from our accompanying friends, they returning toward San Francisco, cheering us, dipping colors, and blowing steam-whistles until out of sight and hearing. Headed to a course W. N. W. (magnetic), with a light head wind, ship steaming three knots. Arranged the sailor-men in two watches of four hours each; the engineer force in two watches of six hours each; while the duties of watch officers were assigned to Mr. Dunbar (Ice-Pilot), John Cole (Boatswain), and William Nindemann (Ice-Quartermaster).

July 9th, Wednesday. — At 3.30 A. M. lost sight of Point Rayes light, bearing N. E. by E. (magnetic). At nine made fore and aft sail, and at eleven made all squaresail, running her off till canvas drew to strong N. W. wind, which raised choppy sea that broke aboard over either rail. Ship loaded very deep, namely, 11 ft. 9 in. forward, 13 ft. 4 in. aft. Foggy, misty, and at times rainy.

July 13th, Sunday. — At ten A. M. inspected the ship and crew, and found everything neat and tidy. Had the Articles of War read and the ship's company mustered. Then read divine service, and was much pleased at observing that every officer and man, not absolutely on watch, voluntarily attended. Clear and pleasant weather; smooth sea.

[TO MRS. DE LONG.]

AT SEA, lat. 38° 13′ N., long. 132° 02′ W.,
450 Miles West of San Francisco,
Sunday, July 13, 1879.

Here we are so far on our way toward the Pole, and it is the most natural thing in the world that I should

sit down to write you. All the first night we had little or no wind, and we poked along slowly, making four knots an hour. The next morning, however, it blew a little from N. W., and freshening rapidly, I put the ship under canvas and steam, and headed her off so that our sail would draw. As the wind freshened the sea got up, and as we were so deeply loaded it broke over us in all directions. For three days we had a very uncomfortable time. Seas were breaking over her rail all the time, and the ship rolled and wallowed like a pig. Mist and rain made it damp inside as well as outside, and she was more uncomfortable than at any time in our bad weather in the Pacific just outside of the Straits of Magellan. Collins and Newcomb promptly went under with sea-sickness, and for three days they were as miserable men as you ever saw. Then the cook got sea-sick, and we had to scratch around for something to eat. The boy seemed to disappear from everybody's gaze for three days, when the doctor found him in the port chart-room, hugging the lockers, and such a specimen. He was just a shadow of his former self, his long pig-tail all in a confused mass of hair flying to the wind, and looking like a corpse resurrected. We gave him some chloroform which straightened him up, and then made him take the lee wheel to keep him in the air, for I really feared he might die. If you could have seen him clutch that wheel frantically whenever she rolled or a sea came on board, with his eyes starting out of his head, and his tongue cleaving to the roof of his mouth, you would understand the amount of anguish he was enduring. Yesterday, however, when the weather moderated and the sea went down everybody brightened up; and as to-day we are having heavenly weather, a bright sky,

light easterly airs, and smooth sea, you would imagine we never had dreamed of such a thing as bad weather.

Now I suppose you will not object to a kind of detailed description of the ship and the people in her. The ship is, I think, all right; she is slow now because she is so deep in the water, running along under steam alone only four and four and a half knots, and burning about five tons of coal a day. But this has been when a heavy swell kept her back. For the last twenty-four hours she has had a light N. E. breeze, and we have made a run of one hundred and thirty miles, or over five knots an hour, and as we are growing lighter every hour we burn coal, I am in hopes in a day or two of getting six knots an hour out of her without trouble. Our cabin is very comfortable and very dry. During the bad weather I had a little fire made in the stove to try it and to dry clothes by, and I assure you it worked admirably, throwing out great quantities of heat and burning but little coal. The forecastle has been as dry as a bone and very comfortable, and the men seem to appreciate it. The only uncomfortable place has been the deck, and that has been wet all the time. We have not had a chance to settle everything into its place yet, but are getting gradually towards it. My room and the starboard chart-room are all to rights, and look quite cosy and cheerful.

Chipp is, as he always was and always will be, calm and earnest. He has always something to do, and is always doing it in that quiet, steady, and sure manner of his. He smiles rarely and says very little, but I know where he is and how reliable and true he is in every respect. He is putting everything in order quietly and steadily, and he has everything reduced already to a system. To-day, when I inspected the

ship she was as neat as a pin, the men nicely dressed, and everything looking more like a man-of-war than it ever had before.

Danenhower is the same as ever, does his work well, and navigates correctly. Melville is as bright as a dollar and as cheerful as possible all the time. He sits on my left at table, and helps me to carve and serve out. We broke a pump-rod two days ago. Some engineers would have wanted to stop the ship a few days for this, or perhaps turn back. Not he; he says, "All right; we will run without a pump-rod, hey brother, and when we get in I will make you a new pump-rod or fifty of them." I believe he could make an engine out of a few barrel hoops if he tried hard. He is one of the strong points in this expedition. He and Dr. Ambler are much alike in some respects. The doctor is all I would have him, bright and cheerful under all circumstances. During our bad weather he was around all the time, cheering up Collins and Newcomb, holding up the Chinese cook, when necessary, and facing the music like a man. He and Melville have christened Newcomb "Ninkum," and occasionally I hear one of them sing out on seeing an albatross, "Here, Ninky, quick, come and catch a goose."

Poor Collins was so sick that he could easily have lost his mother and not have known it. His puns died out for a few days, but he is getting back to them again.

Newcomb in his turn deserves mention. He will, I think, come out all right; he has grit and goes to work like a little man. He was hardly able to stand before he had his lines over the side fishing for albatross, and no sooner had he caught a good one, measuring seven feet across the wings, than he skinned it and got it

ready for mounting. He knows all about his business, every bit, and he takes all about Ninky and the goose in good part, returning to his addressers quite as good as they give. He has his little place in the port chart-room all fixed up with his tools, and is as happy as can be.

Mr. Dunbar is as grave and serious as ever. He frequently speaks about making "pahsages to the South Seas," etc., and has quite a fund of general information which will no doubt be useful to draw from hereafter.

Cole and Sweetman are just the same as they were coming around. Cole, as usual, says nothing, but stands his watch looking all around the horizon as if for a wind. Sweetman looks after the provisions as before, and he and Danenhower have solemn consultations about weights and measures. Our Chinese steward bothers them both dreadfully, for he gets things no matter how carefully they are locked up and put away. He seems to feel that he has but one duty, and that is to get all the food he can and put it on the table. For instance, yesterday he gave us some of that nice cheese which I purchased as a great delicacy during the winter. It was locked up very carefully, but the steward got at it, cut a good large piece out, and placed it on the table, with the pie at dinner. He cannot understand why we should be economical with a ship full of provisions, and, Chinaman-like, will not understand what he does not want to.

The watches are stood by Mr. Dunbar, Cole, and Nindemann. This last is as hard-working as a horse. The second day out a hatchway fell on his little finger and nearly cut it off, but he did not seem to mind it. The doctor sewed it up, and he went ahead as if nothing had happened.

The cook is quite a success since he got over his sea-sickness, and he cooks everything very well except coffee, and that we shall have to teach him. With coffee his idea is quantity and not quality, and what he lacks in the berry he makes up with water.

The men are first-class, happy and cheerful; they have their musical instruments every night and play and sing. There are so many good voices that I am thinking of getting up a choir with Collins at the organ. To-day at church every officer and man was present, except the men in the engine-room on watch. We made quite a congregation.

Having thus described everybody else, I come to your husband, who hardly needs description. I realize that I am engaged in a great undertaking from which neither of us would have me retreat; that being in it I must make a good showing, and study and plan everything to that end. With God's help we shall certainly do something, however small. I realize how much depends on me, and how much everybody will look up to me for guidance; and I know that instead of repining I must buckle to my work with a will.

[FROM THE JOURNAL.]

July 20th, Sunday. — At 10 A. M. inspected the ship, and held divine service. Informed the crew of Mr. Bennett's intention to follow us with a ship next year, and that he would provide for all widows if anything should happen to any of us. This seemed to have a good effect upon the spirits of all hands.

[TO MRS. DE LONG.]

July 29th. — We are now three hundred miles from Ounalaska. We have had an almost steady head wind

and sea ever since the 13th, and have come along slowly in consequence. What few days we have had a fair wind it has been so light as to be of very little use, hardly strong enough to make a draft for our furnaces. Fog and rain we have had nearly every day.

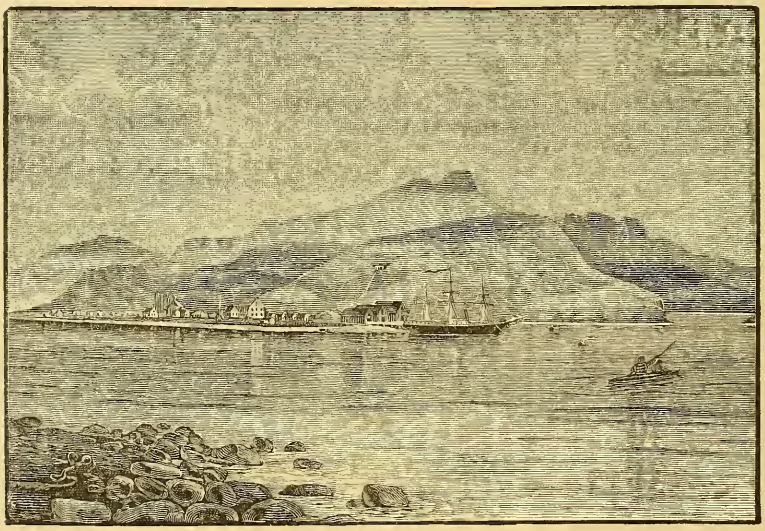
ARCTIC STEAMER JEANNETTE, OUNALASKA ISLAND,
Sunday, August 3, 1879.

Here we are at last, having reached this place yesterday afternoon, after knocking around for two days in thick fogs among a hundred or more islands, very incorrectly laid down on the charts (some of them not at all), and getting mixed up generally. I have seen some crooked navigation, but our experience in getting through the passes into Behring Sea goes far beyond anything for difficulties. Our great troubles were thick fogs and terrible tides. We were never able to see more than three miles in any one direction, and then only for a few minutes at a time. Getting observations was out of the question, for when we could happily see the sun we could not see the horizon; so we had to grope our way along like blind men. However, we got here all right, and here we are, until Wednesday morning, the 6th instant, when we sail for St. Michael's direct, omitting St. Paul's Island.

We found here the Alaska Company's steamer St. Paul — which sails for San Francisco direct on the 5th instant, and will carry our mail and packages, — the revenue cutter Rush, and the Alaska Company's schooner the St. George. The St. Paul has just come from St. Michael's and St. Paul's, and has one hundred thousand seal skins on board, valued at one million dollars. She has collected all the seal skins from the islands, and is on her way back to San Francisco. It is a splendid chance for us to send our letters, and a

quick one, for she will run down in about eleven days, and you ought to have my letters in five days afterwards.

My only reason for stopping at St. Paul's Island was to get some seal skins and leave a mail for the Alaska Fur Company. But I find I can get all the furs I want here, and the St. Paul has brought down all the agents of the Company, and so I deliver the mail here. I am



OUNALASKA.

very glad it is so, because now I can go direct to St. Michael's, which place I hope to reach on the 13th, and leave on the 16th.

Everybody describes the season as an exceptionally open one. The revenue cutter, which has just come south, was as far north as East Cape, and saw no ice anywhere. She did not stop at East Cape or anywhere on the Siberian side, her highest point of call being St. Michael's. At that place everybody was looking anxiously for us, our dogs, sleds, and fur clothing being all ready. The schooner had not yet arrived.

Nothing has been heard of Nordenskjöld. The captain of the revenue steamer supposed he had gone south long ago, or he would have stopped in St. Lawrence Bay to ask. No communication had yet been had with St. Lawrence Bay from St. Michael's, and no tidings had come of course. It is the belief that by the time I get to St. Michael's something will have transpired.

August 4th. — This is a very pretty little place in some respects. It has a beautiful land-locked harbor, surrounded by hills covered with beautiful grass, and looking as green as Brick Church.[1] It is quite warm and pleasant. But the mosquitoes! For the last two nights I have hardly had an hour's rest. Last night I went to bed at ten o'clock, and I assure you I lay awake until half past four this morning killing mosquitoes by the dozen. I am one mass of bites from head to foot. I put up my bed-curtains to keep them out, but they would get in, and seemed to make the curtains an excuse for not getting out. My bulkhead and ceiling is one mass of smashed bodies. I went for them with my slippers right and left, and finally at half past four I dropped off to sleep from sheer fatigue and exhaustion. I was up again at seven, for we breakfast at half after seven.

There is not a white woman here, nothing but men and natives. There is a church here, a Greek church, and yesterday the priest was busy all day marrying couples. The steamer St. Paul brought down a lot of men from St. Paul's Island and St. George's Island who were candidates for matrimony. They reached here Thursday last; made their selections on Friday and Saturday; were married yesterday, and took a stroll to the hill-tops in the afternoon. Some of the men find

[1] A village near New York.

nothing to suit them and are hanging around in a state of indecision.

[TO HON. R. W. THOMPSON, SECRETARY OF THE NAVY.]

ARCTIC STEAMER JEANNETTE, OUNALASKA ISLAND,
August 4, 1879.

. . . . . .

The revenue cutter Rush, during her visit to St. Michael's and her cruise to the northward, passed through Behring Strait, some twenty miles to the northward and eastward of East Cape in Siberia, without having encountered any ice whatsoever. Supposing that Professor Nordenskjöld had already passed south, no communication was had by the Rush with St. Lawrence Bay. No communication from St. Lawrence Bay had been received at St. Michael's at the date of the sailing of the Rush on the 23d July, and consequently there was no knowledge of the safety or movements of Professor Nordenskjöld's party. It was my intention originally, as communicated to you in my letter of July 8th, to stop at St. Paul's Island, after leaving this place; but as the fur clothing which I was to have received at that place can be furnished here, I have concluded to proceed directly to St. Michael's in Alaska, leaving here on Wednesday morning, the 5th August. From all the intelligence received from the northward it appears that the last winter has been an exceptionally mild one, and that no obstruction to navigation in the shape of ice has been encountered. I can but deplore that the necessity of loading the ship so deeply at San Francisco has made our progress thus far so slow, owing also to head winds and swell, as to make it doubtful whether we shall be able or not to profit by the open water in the Arctic Sea in our efforts

to gain a high latitude this season. If, upon our arrival at St. Michael's, nothing has been heard of the party under the command of Professor Nordenskjöld, I shall proceed to St. Lawrence Bay in Siberia, to obtain tidings of them.

We have been made the recipients of the most unbounded courtesy and assistance of the Alaska Commercial Company, through its agent at this place. The coal belonging to the Navy Department, and of which there was originally, I believe, some seven or eight hundred tons, has become reduced by the requisitions of the revenue cutter to about eighty tons, which, owing to exposure and spontaneous combustion, has become of indifferent value. The commanding officer of the Rush, having expressed to me his desire to have the remaining quantity reserved for his use in proceeding to San Francisco in the coming fall, I have accepted the offer of the Alaska Commercial Company to furnish one hundred and fifty tons bituminous coal for the use of the expedition. This matter will form the subject of a private arrangement between Mr. James Gordon Bennett and the Alaska Commercial Company, and has no relation to our official transactions. We have also been furnished with fur garments, and twelve thousand pounds of dried fish for dog food, both of which have been sent here by the Alaska Commercial Company for our use, from Kodiak. The balance of our clothing, forty dogs, more dog food, sledges, and dog drivers will be furnished at St. Michael's.

I would respectfully call your attention to the fact that the charts of this region are very meagre. The most reliable is one published by the Imperial Russian Hydrographic Office in 1849, which chart was furnished me in San Francisco. The prevalence of fogs, and the

rapidity and uncertainty of prevailing tides, make an approach to any of the passes between the Aleutian Islands hazardous in the extreme.

[FROM THE JOURNAL.]

August 5th, Tuesday. — The St. Paul sailed for San Francisco at 3.30 A. M., carrying our letters and my packages to General Miller. I received from the Alaska Commercial Company a long list of articles for which Mr. Greenbaum declines to receive payment. I desired particularly to pay for the labor of coaling ship, but he replied that his orders from General Miller were to furnish everything we needed without charge, and he cannot take any money even in return for what he expends from the company's funds.

[TO MRS. DE LONG.]

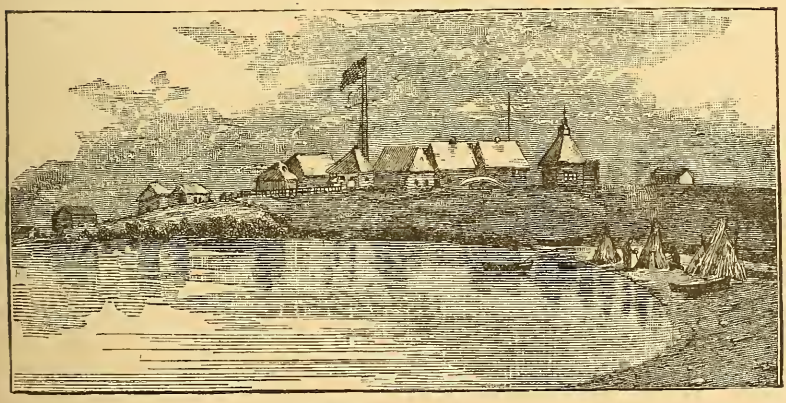
Nothing could exceed the courtesy of the company's agent, Mr. Greenbaum, during the whole of our stay. The entire storehouse was placed at our disposal. A lot of fur clothing had been sent over from Kodiak for our use, — reindeer coats and gloves. We also received eighteen thousand dried fish for dog food, and twenty-five pup seal skins for blankets and floor covers or carpets. The agent gave me for my own use a beautiful coat made of pup seal skins; besides, he gave me a large gown lined with birds' feathers as a morning gown, so you see my luck of having other people give me things has not changed.

When we left on the morning of the 6th everybody was up to see us off; and besides dipping of colors, we had a salute from three small guns in front of the company's office. The priest, no doubt, was among the party, but we cannot say whether the brides and grooms

were there or not. Everybody wished us all sorts of good luck as we steamed out. The first day, of course, we had a head wind, though a fair wind had been blowing for the three days that we were in port. The second day, however, we had a nice little breeze, which freshened so much that — will you believe it? — we made one hundred and seventy-three miles in the first twenty-four hours, and one hundred and thirty-six in the next. Then the wind failed us and came out ahead, and this day we are down to our old speed of four knots.

St. Michael's, *August* 12, 1879.

We reached here this morning at ten o'clock. The navigation was not so troublesome as at Ounalaska,



ST. MICHAEL'S

because we had no fog; but the general uncertainty, owing to poor charts and shoal water, made me sufficiently thankful when our anchor was let go off this collection of native huts and one storehouse.

Our schooner [the consort with coal] has not yet arrived, and there is no news of Nordenskjöld. The Alaska Company's agent promptly came on board to welcome us and receive his letters. He had almost given up the idea of seeing us this year. No commu-

nication has been had with St. Lawrence Bay this season, and he knew no more than we could tell him.

I confess I am seriously embarrassed. I fully hoped to find our schooner here, and to learn some tidings of the Swede. I am disappointed in both. I have not coal enough in the ship to warrant me in going away without waiting for the schooner, and it follows that I must await her arrival. Then we must go to St. Lawrence Bay for one more effort to learn something of Nordenskjöld, and, should we learn nothing of him, poke along the northern coast of Siberia until we are frozen in for the winter. Meanwhile our fine season is slipping away, when we might reach Kellett Land and push on to the northward. There are only ten tons of coal here at the station, and that is wanted this winter. I had an idea of pushing over to St. Lawrence Bay to ask about Nordenskjöld, and then coming back to meet the schooner; but this would require us to make double the distance and burn double the coal, and that will not do. Then I thought of going across and leaving orders for the schooner to follow us; but it might take her so long to get across that I gave that up. So I am resigned to wait patiently for the Fanny A. Hyde to arrive.

I have got all the natives at work making our clothing, and it is somewhat of a comfort that in one respect our time is not being wasted. Our dogs and sleds and harness are all ready. These dogs are fine animals, young and active, and they took to me very kindly to-day when I visited them on shore.

This is a miserable place. There are exactly four white men here, and not one white woman. Of the four white men, one is a servant, one Mr. Newman, the agent, one his brother, and the fourth is a private in

the Army Signal Corps, named Nelson, stationed here for the five years of his enlistment to make and record meteorological observations. Desolate and cheerless as the place is, we may yet look back upon it as a kind of earthly paradise.

Our little family of thirty-two having been together now for some time, I can judge of the harmony existing among them. In the cabin everything goes on smoothly and harmoniously. Chipp is as unchangeable and imperturbable as ever; he is occupied now in building a cook-house on deck in the place where the old one stood, but not quite so large. We have considered this wise, because we have already had trouble with the draft to the galley; for it positively refused to burn on the port tack, and besides I want to have the galley where I can look at its cleanliness every hour of the day. Our Chinese servants — but I will tell you about them further on.

Danenhower is the same, and will probably always remain so. He is a hard worker, always writing the log, or figuring over his navigation or provision account.

Melville is more and more a treasure every day. He is not only without a superior as an engineer, but he is bright and cheerful to an extraordinary extent. He sings well, is always contented, and brightens everybody by his presence alone. He is always self-helpful and reliant, never worries about the future, is ready for any emergency, has a cheerful word for everybody night and morning, and is, in fine, a tower of strength in himself.

Dr. Ambler seems a kind of Mark Tapley, jolly when he is probably most uncomfortable (for he is inclined to sea-sickness). He does not take very kindly to canned meats, and utterly denies himself the luxury of our

very superior hash. We have abundance of fresh potatoes and turnips yet remaining; in fact, the deck is full of potato sacks, and he lives mostly upon vegetables. We got a whole sheep in Ounalaska, where, by the way, we also got some fresh beef, and he (Dr. Ambler) is not quite a skeleton yet.

Collins is the same Collins, getting off puns all the time, some of them good and some wretchedly poor. For a while we steadily refused to see his puns, and would all look at him as innocently and inquiringly as babies when he got one off, asking him to explain it two or three times over, until he finally exclaimed that our intellects must be weakening in proportion as we increased our distance from San Francisco. Now, however, we let him pun away, praise the good ones and condemn the bad.

For myself, I am doing all I can to make myself trusted and respected, and I think I succeed. I try to be gentle but firm in correcting anything I see wrong, and always calm and self-possessed. I feel my responsibility and care, and I hope I appreciate the delicate position I am placed in of leading and directing so many people of my own age. I hope God will aid me in what I have undertaken, and bring me through it in safety and with credit.

August 18, *Noon.* — Our schooner has just arrived, and we have her alongside, and shall soon commence hoisting in her precious cargo, — coal and provisions. During the past six days many longing and anxious looks were directed toward the horizon for a sight of her, and I had already experienced that "hope deferred maketh the heart sick." Now that she is here we are up to our eyes in work and excitement, for I have appointed Wednesday morning, the 21st inst., as

the date of sailing for St. Lawrence Bay. If God will only give us fair winds and let us save our coal until we are through Behring Strait, we may find Nordenskjöld and reach Kellett Land before the ice freezes us in.

Although the beginning of my letter was dated the 9th, I have been writing a little in it every day. So you must not suppose that nine days went by without my having thought of you and written to you. In fact, I am all ready to go on and tell you about the crew where I left off the day before yesterday.

There is no doubt about it that we have as fine a crew as ever went on board of a ship. They are cheerful, good-humored, ready for anything, and as harmonious as one family. There has not been a sign of a disagreement or a suspicion of a growl. The men seem to realize that every effort is being made to make them comfortable, and they are really very comfortable. Well clad, well fed, and easily worked, they seem to appreciate the easy places in which their lines have been cast. Being in ports where it is illegal to sell liquor there is none to be had, and liberty means simply a chance to go ashore and wander around in the mud and grass. We have set our seine, and have caught enough salmon and flounders to give everybody fresh fish nearly every day. When we could get geese and ducks we have sent a fair portion forward among the men, and have shared alike; and when no geese or ducks were to be had we eat canned meat in common.

The Chinese cook is a good cook, and, as I said in my previous letter, makes good bread; but unless we conclude not to watch things too carefully, and to make no fuss over a stray hair or so, we cannot be happy.

The steward is fair as a steward, and the boy is sim-

ply waste lumber. Under no circumstances shall I keep him beyond this port. He cannot speak English or understand it; he has already, by his stupidity, almost made me grow gray. With it all, he is as childlike and bland as the celebrated "heathen Chinee." He will spill water, break a plate, or stumble over us with a smile that is almost heavenly. All that he is good for is to aggravate the steward, who, though he is his countryman, pitches into him in Chinese without stint.

Our furs are all being made up into clothing on shore, and we have a very fine outfit indeed. With my usual luck, I have met another man who makes me presents. The agent here, Mr. Newman, besides giving me his own outfit of fur clothing, insists on my taking his Winchester repeating rifle with eight hundred rounds of ammunition. In vain do I protest that I do not want it, — the ship owning already four, of which I use one. Mr. Newman seems to think I shall not be properly equipped unless I take his rifle, and so rather than give offense I accept it.

I also organized and sent off a hunting party in the steam-cutter, consisting of Melville, Collins, Dunbar, and the doctor. I gave them a tent and so forth, and they remained away all night, coming back with about a dozen ducks, and stiff and aching from the tramp and sleeping on the ground. The doctor says he is convinced that man must take to hard work gradually to get accustomed to it. I think a tramp like that about once a year would suit him very well.

[FROM THE JOURNAL.]

August 21*st, Thursday.* — A busy day with us. Commenced to swing ship at nine A. M. for compass deviation. At one P. M. commenced receiving stores from

Mr. Newman, consisting of our fur clothing, forty dogs, five dog sleds, forty sets dog harness, snow-shoes, tanned seal-skins, dressed beaver-skins, twelve sleeping bags, sixty-nine pairs seal-skin boots, seven pairs deer-skin boots, twenty-two pairs water boots, seventy-eight pairs blanket socks, thirteen dressed skins, two dressed wolf-skins, fifty-two double squirrel jumpers, twenty single squirrel jumpers, four light squirrel jumpers, three tame deer-skins, fifty deer-skin pantaloons, twelve hair-seal pantaloons, one undressed deer-skin, four dressed beaver-skins, one baidera, twenty cakes, 2,290 lbs. compressed dog food, etc. The made up garments have been manufactured from the skins, and ten blankets we sent on shore upon our arrival.

Mr. Newman generously presented me with a Winchester sixteen-shooter, eight hundred rounds ammunition, two deer-skin jumpers (parkies), seal-skin boots, water boots, sleeping bag, gloves, and fur cap. To this I must add a beautiful Arctic hare coverlet from Mr. Ketchum, and sixty mink-skins from the same gentleman for ship's use.

In our communications with the natives on the Siberian side we must have an interpreter, and it is advisable also to have some one acquainted with the driving and management of dogs and sleds. For these reasons I have hired two natives, named respectively Alexey and Aneguin, recommended by Messrs. Newman and Nelson, the Signal Corps observer, as well as collector for the Smithsonian Institution. Alexey was a collector of specimens for him, and speaks English and even writes it a little.

The terms of agreement are as follows: Alexey is to receive twenty dollars per month and a proper outfit, which amounts to fifty dollars, and at the comple-

tion of his service a breech-loading (that is, Winchester repeating) rifle and 1,000 cartridges. His wife shall receive provisions (from Alaska Commercial Company at our expense) during his absence amounting to five dollars a month. Aneguin is to receive fifteen dollars per month, a proper outfit amounting to fifty dollars, and his mother shall receive provisions (also at our expense) during his absence amounting to five dollars a month. Both men shall be clothed and found in the necessaries of life until their return to St. Michael's, Alaska Territory.

These two men came on board with me at five P. M. Alexey was accompanied by his wife to say good-by, and also his chief. To the wife we gave a China cup and saucer, with the monogram U. S. N., which pleased her greatly, and for her boy a mouth harmonicum; for the chief, I authorized Mr. Newman to issue a suitable present from the store at our expense. Alexey and Aneguin were nicely dressed up in white men's clothing, and each wore a hat with a red band around it.

The adieux being said at 6.30 P. M. Mr. Newman and Mr. Nelson left us, and at seven P. M. we got under way and steamed out, being saluted with six guns by Mr. Newman and three guns by Mr. Ketchum, and answering with our steam-whistle.

[TO MRS. DE LONG.]

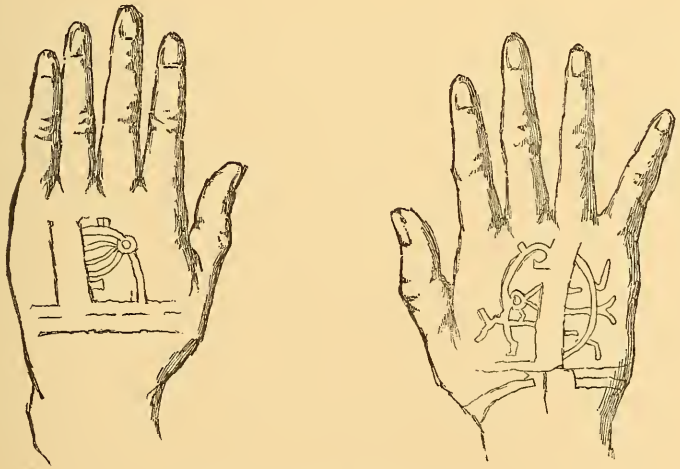
AT SEA, *August* 22.

I have changed all my plans. On the 20th, while we were hoisting in our coal and provisions, I made up my mind that the schooner had about twenty tons more coal than we could carry from here; and as we had to go over to St. Lawrence Bay, I decided that if we had that amount of coal there to replace what we

burned in going over, we should be better off than if we left it behind at St. Michael's. Hence I stopped receiving coal and provisions and got ready for sea, and last evening at seven o'clock we steamed out of St. Michael's, and are now on our way to St. Lawrence Bay. I ordered the schooner to follow us, and she was to leave this morning, and no doubt will arrive quite as soon as ourselves, for she is light and we are very deep. The sea is as smooth as glass, however, and we are going along very nicely. The distance is only three hundred miles, and I expect to make the run in two and a half days.

ST. LAWRENCE BAY, SIBERIA, *August* 25, 1879.

When I had got as far as saying that we expected to make our run in two and a half days I stopped writ-



Native Tattooing. St. Lawrence Bay.

ing for the night, expecting to make a day of it on the 23d for letter-writing. When I got up on the morning of the 23d it was to find an unsettled look in the

weather with quite a swell from the northward. I kept on because we had either to do that or turn back, and I did not like to turn back. As we got out clear of the land into Behring Sea the wind freshened considerably, but we were running along five knots, and every mile made good on our way, and I could not complain. The water is so shallow in Behring Sea that a very ugly sea is raised in a short time, and consequently we had it coming aboard in all directions; we slowed the engines and eased her somewhat, but it freshened to a sharp gale before many hours, and then we had it lively enough — so lively in fact that I had to lay her to and ride it out. This gale lasted about thirty hours, and then moderated enough to let us proceed on our way yesterday afternoon, and enabled us to reach here today at two o'clock P. M. While we were in the gale the day before yesterday one unusually heavy sea broke on board, struck the front of the cabin on my side, stove in my window, and completely flooded my room. I was sitting dozing in my chair, when suddenly I was buried by the sea, covered with broken glass, and everything I had was afloat.

Our forty dogs are a great item. They are all good sized and strong, and thus far roam around the deck in a happy go lucky kind of way, fighting every five minutes, and seemingly well contented. We have five dog sleds from St. Michael's, and the four we brought from England make nine altogether. I got also three skin boats. I hired two natives to go with us as dog drivers, very decent, intelligent men, and, wonderful to relate, very clean. I had them rigged out in white men's costume, and they look very swell indeed. They live with the men of course, and their duty thus far is to feed and water the dogs. The nature of these dogs

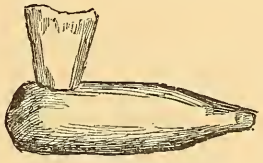
is to fight at all times, and unless they are beaten well they will not keep the peace at all.

Before leaving St. Michael's I discharged the Chinese boy and placed him on board the schooner for passage to San Francisco; he went on board the schooner with the same childlike and bland smile that has ever characterized him, accepting the inevitable as a philosopher.

St. Lawrence Bay reminds me of the scenery in the Straits of Magellan, with mountains two thousand feet high capped with snow; the bay is magnificent and solitary. A few dirty natives, clustering alongside the ship for bread, are the only signs of life. The natives have nothing to sell, and appear lazy and worthless to the last degree.

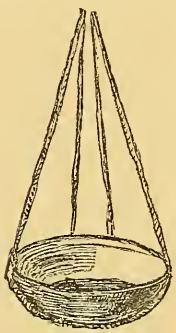
[FROM THE JOURNAL.]

August 25th. — A chief who calls himself "George," and who speaks very often of Captain Cogan in the little English he knows, told me he saw in one of his journeys last winter a ship frozen in in Koliutchin Bay. All my questions as to whether he boarded her then or not could not bring a satisfactory reply, he one time saying "yes," and the next time "no." When I showed him the chart of Admiral Rodgers' survey in the Vincennes, he readily pointed out Koliutchin Bay, East Cape, the Diomede Islands. Continuing his story, the chief said three months ago the same ship which he had seen in Koliutchin Bay came to anchor off his "house," at the northern side of the entrance to St. Lawrence Bay — the bay itself being at that time full of ice. The vessel was a steamer smaller than the Jeannette. This time he undoubtedly went on board.



Bone-Pipe.

He says there were twenty-five people on board the ship. The captain was an old man with a white beard, and he did not speak English. There were two officers on board who did speak English, and there was another officer, who was a Russian, and he spoke the Chuckch language like a native. To this last officer the chief spoke. When I asked him if he knew the officer's name, he replied, "Yes, he name Horpish." On looking over the list of the officers who accompanied Nordenskjöld, I find a Lieutenant Nordquist, Russian Navy, and it may have been this officer to whom the chief spoke. He did not know the name of anybody else. This "Horpish" told him the ship was Swiss, (query Swedish?) had wintered in Koliutchin Bay, and was going home. Nobody seemed to have any fur clothing, and everybody that came on deck shivered with the cold. The chief showed me the track of the steamer from Koliutchin Bay to St. Lawrence Bay, and pointed out the course of the steamer on leaving as towards the Diomede Islands, and thence south along the coast of Kamtchatka. Remaining only until the next day, the vessel steamed out. According to the chief she had "plenty coals." As a way of fixing the date more clearly than the vague statement "three moons ago," this steamer arrived seven days after the departure of Captain Cogan. Nothing else had since called at St. Lawrence Bay until our arrival.[1] This

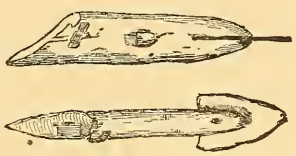


Native's Lamp.

[1] "None of the natives in the neighborhood of the Vega's winter station professed the Christian religion. None of them spoke any European language, though one or two knew a couple of English words and a Russian word of salutation. This was a very unfortunate circumstance, which caused us much trouble. But it was soon remedied by Lieutenant Nord-

was the sum and substance of the information, and although I questioned the man carefully and repeatedly I could learn nothing further, while the same story was each time repeated in detail. I can account for our not hearing of the arrival of Nordenskjöld, at some place in civilization up to our departure from San Francisco, only on the ground of his being obliged to sail the whole distance to Japan, which is a likely enough supposition.

I landed and strolled over the sand-spit, dignified with the name of Lutke's Island. Here and there were skeletons of whales' heads, bones of walruses, etc.; and I saw what seemed to be a grave, without, however, any mark beyond nine small stones laid in the sand, in this shape : —



Bone Harpoon Heads.

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When we anchored, large numbers of ducks seemed to make this sand-spit a resting-place, and several of them with their little families swam around us. But the ship and ourselves seemed to frighten them immediately away, for not one duck was to be found on the island, and the mother ducks and their young paddled away incontinently. A small pond in the centre of the spit was resorted to by small birds like snipe, and Mr. Newcomb shot several to add to his collection. The natives

quist specially devoting himself to the study of their language, and that with such zeal and success that in a fortnight he could make himself pretty well understood. The natives stated to De Long, in the autumn of 1879, that a person on the 'man-of-war,' which wintered on the North Coast, spoke Chuckch exceedingly well." — A. E. Nordenskjöld's *The Voyage of the Vega*, p. 369.

here appear to be in a wretched condition. Each family of about a dozen, adults and children, roamed about in its baidera.

[TO MRS. DE LONG.]

August 27th. — The schooner arrived last evening, and we are now hoisting in the last of the coal and pro-

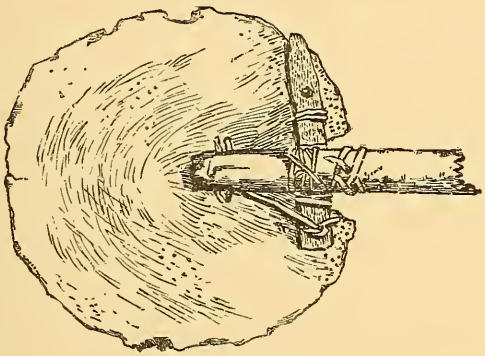
Native's Knife of Bone.

visions, and shall leave at seven o'clock this evening. The weather is beautiful, light southerly breeze, and smooth sea, and I am anxious to be off. And yet it seems like saying good-by once more. However, I am in this thing and I am going to see it through.

I have interviewed the chief who saw the steamer several times since, and I have about come to the conclusion that it was Nordenskjöld's steamer that he saw. When I telegraphed the Secretary asking if the rumors concerning the Swedish Expedition were reliable, he referred to the Secretary of State. This Secretary telegraphed to our Minister at Stockholm, and the Minister telegraphed back that Nordenskjöld, when last heard from, was at Cape Serdze Kamen, and was to leave in May. Now Cape Serdze Kamen is one hundred and thirty miles from here, and there is a settlement on the Cape. I have decided to go there and make an inquiry, and if I find the Swedes were there and have left, I shall push for Wrangel Land at once; if not — and there is the sticker — I suppose I shall have to grope along until I find where they did winter. We have nearly one hundred and sixty tons coal, and all

our provisions in the ship, and we can afford to steam a great deal yet.

We shall tow the schooner outside the harbor as we go. The natives are rather an ugly looking lot, and I do not care to leave the schooner alone with her little crew of six men. I have given the captain fifty dollars for himself; he has waited upon us faithfully, and carries back our mail-bag to General Miller for us, as well as our smiling angel of a Chinaman.



Bone Shovel, Front View.

Bone Shovel, Side View.

CHAPTER IV.

DRIFTING IN ICE OFF HERALD ISLAND.

27 *August* — 30 *September*, 1879.

Through Behring Strait. — Cape Serdze Kamen. — A Letter left for Later Vessel. — Chief George. — Koliutchin Bay. — Definite Tidings of the Vega. — Coasting an Ice-Pack. — Herald Island sighted. — Grinding through the Ice. — The Rudder unshipped. — Setting Bear-Traps. — A Sledge-Party toward Herald Island. — Return of the Party. — A Bear-Chase. — Herald Island Disappearing. — Experiments to determine the Air breathed on the Berth Deck. — Consumption of Coal. — The Drift Ice. — An Electric Phenomenon. — Bills of Fare. — Daily Routine.

August 27*th*, *Wednesday*. — At 7.35 P. M. we got under way, with schooner in tow, and stood out. Let go of schooner at 9.30, and she stood to the southward and eastward, with northeast wind, while we shaped course N. N. E. and stood toward Behring Strait.

August 28*th*, *Thursday*. — The day opens with its (to us) usual accompaniment, a head wind. As we approached Behring Strait, the wind freshened considerably, blowing from N. N. W. true, a heavy fog blowing over the bluff highland on the Asiatic side. Just to the southward of East Cape saw a schooner close under the land and standing to the southward. Upon showing our ensign, she hoisted American colors. As she had a crow's-nest at her mast-head, I assumed that she was a whaler. The wind seemed to draw regularly down through the Strait as through a funnel, and as we passed through, the wind hauled to the westward

with us, finally heading us at N. W. true. The surface water ranged from 2° to 4° higher than the air in temperature, but I was unable to detect positively any current, although it would seem natural to suppose that the warmer water set to the northward. The dredge brought up from twenty-eight fathoms a fair collection.

August 29th, Friday. — Before leaving St. Lawrence Bay, I had decided to call at Cape Serdze Kamen to seek tidings of Nordenskjöld. While in San Francisco, I had seen in the newspapers that he had passed through Behring Strait; and I telegraphed to the Navy Department asking if such a report was considered reliable. Before sailing, the Secretary of the Navy sent me a copy of a communication from the Secretary of State, giving the words of a cablegram from Mr. Stevens, our Minister at Stockholm, who had been telegraphed to for information: "Last at Serdze Kamen; was to sail in May." Besides this, I had received a cable from Mr. Sibiriakoff, of St. Petersburg, asking me to leave papers for Captain Sengstaecke, commanding the A. E. Nordenskjöld, a vessel built by Mr. Sibiriakoff, to go in search of the Vega. For these two reasons, therefore, I determined visiting Serdze Kamen, with the hope also of verifying the tidings received at St. Lawrence Bay.

The land to the northward and westward of Behring Strait is so vaguely described in books of sailing directions, and so roughly delineated on the charts, that it was very difficult to determine which cape was Cape Serdze Kamen. We have had no observations for latitude or longitude at noon, and are rather uncertain as to our whereabouts. However, between noon and four P. M. I stood in toward the land for a kind of bay surrounded by high round hills, and at four sighted a col-

lection of native houses on the port hand on a high bluff, and another collection of native houses right ahead on the beach at the foot of the bay. At the same moment the sun appeared, and Mr. Danenhower, by using the given latitude of Cape Serdze Kamen, N. 67° 12′, obtained the longitude as given that place on the chart. This bay appeared to have a general north and south direction, to be about seven miles in width at its entrance, with fine large headlands. All around the edge of the bay was fringed with broken pieces of bay ice in a soft and rotten condition. The bay was in depth about four miles, I should say. Stood in carefully, keeping lead going, and at 5.10 P. M. anchored in 8 1-2 fathoms water, hard bottom, sand, and stones. We kept steam ready for a start at a moment's warning, for a fresh N. W. wind, rough sea, and hard bottom made our anchorage a little precarious.

As soon as the crew had supper, I took whaleboat, and, accompanied by Lieutenant Chipp, Mr. Dunbar, Mr. Collins, and the Alaskan, Alexey, went in towards the settlement at the foot of the bay. I drew up the following paper to be left with the natives, addressed "To the Commanding Officer of any Ship visiting Cape Serdze Kamen:" —

UNITED STATES ARCTIC STEAMER JEANNETTE,
Cape Serdze Kamen, August 29, 1879.

This vessel stopped in here this day at five P. M. to endeavor to learn something about the Swedish Exploring Expedition under the command of Professor Nordenskjöld. We arrived at St. Lawrence Bay on the 25th inst., and learned from the natives there that a steamer which had wintered in Koliutchin Bay had come to St. Lawrence Bay and remained one day, sailing, three months before our arrival, for home by way of the Kamtchatkan coast. Her captain was an old man with a

white beard, and he did not speak English. Two officers on board did speak English, and there was an officer who was Russian who spoke the Chuckch language like a native. With this last officer, who was named Horpish (?), the natives spoke, and were told the ship was a Swiss (?) which was going home, having wintered in Koliutchin Bay. We left St. Lawrence Bay at 7.30 P. M. August 27th. Came here because this is the place at which Nordenskjöld is last reported to be, and because I was requested by Mr. Sibiriakoff, of St. Petersburg, to leave papers here for Captain Sengstaecke, who commands the steamer Nordenskjöld, now on her way here from Europe. The officers and men under my command are all well, and we expect to sail to-night for Wrangel Land by Koliutchin Bay.

Please communicate this news of us to the Secretary of the Navy, Washington, D. C., United States of America.

GEORGE W. DE LONG,
Lieutenant U. S. Navy,
Commanding American Arctic Expedition.

With this letter and a bundle of newspapers addressed to Captain Sengstaecke, I attempted to land. Upon getting in toward the beach we found so much ice moving about as to make a landing impossible; but after pulling to and fro for about half an hour, we saw the natives getting ready to come out to us in a skin boat. Presently they succeeded in getting out, but to our disappointment we could not make each other understood. Hoping to learn something by persistence, we led the way back to the ship, the natives following in obedience to our signals. The chief, a stout, not ill-looking man, was seated amidships in his baidera, clad in a bright red tunic and a cloth cap (that evidently came at some time from civilization), with all the dignity of a king.

Upon arriving on board ship nothing could make this

chief or his people understand what we wanted to know, and after an hour's effort, backed by charts and all sorts of pantomime, we had to give it up and let the natives go ashore. I could not leave it like this, so I determined to wait until daylight, send Chipp in again to make a landing if possible, and look for any traces of white men having been there.

August 30th, Saturday. — At three A. M. Lieutenant Chipp went in shore in the whaleboat, accompanied by Mr. Dunbar and Alexey, as also by Mr. Collins. This time a landing was effected, and by great good luck a satisfactory result was obtained. Upon entering the chief's hut another attempt was made to make him understand what we were after, without avail. By a happy inspiration an old squaw was brought forward (who came originally from somewhere in the neighborhood of King's Island), and it was found that Alexey and she could understand each other. From that time forward all was plain sailing. The story heard at St. Lawrence Bay was repeated in detail, — the steamer having stopped here also one day and then gone home. "Horpish" seemed to be equally well known here. Following Chipp's return on board came the chief and his tribe, including the old squaw, and we had the story over again, with the addition that the steamer had wintered on the east side of Koliutchin Bay, had built a house, (an observatory?) which she took down and carried away on leaving. Times and dates we could not get at, nor names, except the never-failing "Horpish."

If Nordenskjöld had left any kind of a written paper at St. Lawrence Bay, or at this place, it would have saved much uncertainty; but as he had no uneasiness about his situation, and of course knew nothing about the excitement in Europe and America, his not leaving

any paper is not to be wondered at. As Koliutchin Bay was somewhat in our track I concluded to look in there in passing.

Lest anybody coming after us should be perplexed for want of proof of our having been at Serdze Kamen, I made sure that the chief knew that he must exhibit the letter which I wrote yesterday to any ship that called in; and, moreover, I gave him a sailor cap with the ship's ribbon bearing the word "Jeannette" in bright gold letters, of which the chief was so proud that I knew he would exhibit it to all foreigners. Collins wrote a notice of our visit on a piece of paper which I signed, and it was pasted in this cap.

All these things being done, and tobacco, tea, and bread being presented (rum was asked for but declined) to the chief and needles to the squaw, and some salmon and deer meat being returned by them, we said good-by, and at six A. M. got under way and steamed out. At ten A. M. saw a baidera under sail standing for us from still another collection of huts near the west cape of this bay. Ran down to them, but as they could not be understood by us, and evidently had not much to say, we left them and proceeded on our way. Foggy and misty from noon to midnight; N. W. and N. winds.

August 31*st*, *Sunday*. — During the night let the ship run along west. At five A. M., having run off enough distance to bring us on the meridian of the eastern edge of Koliutchin Bay, sighted a point of land bearing south true, and a low coast line extending east and west. An extensive pack of old ice continuing to about five miles from the land seemed to reach as far as eye could see east and west, with a funnel-shaped opening, the funnel point toward the land. Supposing that such an opening would be caused by a river empty-

ing its waters into a bay, and the chart showing such a river flowing into Koliutchin Bay, I decided to stand into the opening, which we accordingly did at 5.40, the land being hidden at times by passing snow-squalls.

At seven A. M. made out what looked like houses on the ridge of a small hill back from the beach, which I now saw we could not get to on account of the bay ice fringing it for about two miles in extent, — our funnel-shaped opening closing up at that distance from the shore. A little later I could make out several houses quite plainly from my post in the crow's-nest, and at eight o'clock, having reached the edge of the ice, stopped the ship and sent in Lieutenant Chipp, Master Danenhower, Mr. Dunbar, and Alexey in the whaleboat, for one more effort to make sure that Nordenskjöld had passed south in safety. During the absence of the whaleboat kept the engines ready to move the ship, and backed when it was necessary to keep the ship off the ice. At ten, got a sounding in fifteen fathoms, coarse gravel, and lowered the dredge with good results. Mr. Newcomb also shot and added to his collection some large gulls. The whaleboat could be seen from the ship aloft, winding her way in and among narrow lanes of water, and I watched her anxiously while Melville handled the ship, until I saw her land and her people mingle with some natives who had come down to the beach to meet the boat. At one P. M. Lieutenant Chipp and party returned, and brought back information which was reliable beyond question. The Vega wintered here, about two miles more to the southward and westward than this native settlement. Chipp was walked along the beach and the place pointed out to him. As well as could be made out (for no one spoke or understood English on

shore, and Alexey was of no more use in this country than ourselves), the Vega left here for the eastward two or three months ago. Tokens of the Vega were bought by Chipp, he using his vest buttons as ready cash, and brought off to the ship. [Among other things there were three navy buttons, — Swedish, Danish, and Russian.] These navy buttons alone would be proof enough of the Vega having wintered here, because no other ship was in this part of the world with Swedish, Danish, and Russian naval officers on board.

Hoisted the whaleboat and steamed out to the northward at 1.10; at two held divine service, and I believe all our hearts were thankful that at last we knew Nordenskjöld was safe, and we might proceed on our way toward Wrangel Land.[1]

The ice on the western side of our funnel-shaped opening made out from the land, so that it was 5.15 P. M. before we were clear enough of the pack to shape our course N. W. by N. At six we sighted a large island, supposed to be Koliutchin Island. During the first watch we were much bothered by loose ice in large lumps, requiring constant conning to avoid trouble. At ten P. M., finding the ice growing heavier, I put her on the other tack to N. E. true, and stood out of it, stopping the engines from 11.40 to twelve, to let the ship drift through some small openings into open water.

September 1st, Monday. — An ordinary day, so far as events go. During the afternoon land was sighted bearing S. W., — probably the land around Cape North

[1] Baron Nordenskjöld, after wintering at this place, was released from the ice July 18, 1879, passed Serdze Kamen on the 19th, anchored off St. Lawrence Island on the 31st, and again off Behring Island August 14th, reaching Yokohama September 2d. When Captain De Long saw Chief George, therefore, the Vega had been gone a month only, and not three, as he gathered from the chief. — Ed.

on the Siberian coast. Although this land is sixty miles from our position, I can account for our seeing it only by mirage. It did not really seem over thirty miles. A considerable amount of pack ice was between us and this land. We were favored with a beautiful sunset, and a moonlight and starlight night.

September 2d, Tuesday. — On our course from eight last evening until seven this morning, — N. W. (at which time we were about one hundred miles from the southeast cape of Wrangel Land). But at the last-named hour made the ice-pack ahead, and extending as far to the westward as we could see. During the forenoon watch we ran through a lot of loose ice, making a true north course as well as possible. At 11.30, being through the loose ice, were confronted by the solid pack, which headed us off to the N. E. true during the afternoon watch while we were skirting it.

At noon sounded in twenty-four fathoms, — thick blue mud and shells. A fine S. E. breeze had sprung up by this time, to which we made all sail, and were slipping along six knots while coasting the pack. Being headed off to N. E. true, and increasing our distance from Wrangel Land instead of diminishing it, I decided at nine P. M. to bank fires, save coal, and let her go under sail for the night. Stopped engines therefore at 9.50. To-day, having bright sunlight all day, were able to locate our position by observation. Latitude 69° 10′ N., longitude 176° 6′ 30″ W.

September 3d, Wednesday. — A lively day. At one A. M. sighted the ice ahead and on the weather bow. Hauled sharp by the wind, but before we could get steam had closed in on the ice, striking it easily with our port side, and we lay there until we had steam enough to crawl off. No damage done. Found we had

drifted into a bay in the ice. Hauled off to the eastward and southeast.

At daylight the weather became thick and foggy. Sighted a barque to the S. E. under all sail. Had her in sight for three hours, when we lost her in the fog. At her nearest she was four miles distant, and we were too anxious about finding a decent opening in the pack to run down and speak her. At eight A. M., there being nothing but ice in sight, except to the S. E. where we had come from, I concluded to put the ship into a likely looking lead in the pack opening towards the N. W. We accordingly worked along in this lead, keeping a general N. W. direction until 3.10 P. M., when it became so foggy and the ice so closely packed that we stopped and planted an ice-anchor in a convenient floe. Meanwhile, at noon we got soundings in twenty-eight fathoms (blue mud), and towed the dredge, adding some star-fish to our collections. At 4.30 the fog lifted a little and we got under way, working to northward true until 5.30 P. M., when we again anchored to a floe, the fog becoming impenetrable. Calm with thick fog up to midnight. At seven P. M. sounded in thirty-eight fathoms (blue mud). Tired with my day in the crow's-nest.

September 4th, Thursday. — The day opens calm and with a thick fog. Still at anchor to the floe. We observe a gradual closing in of large floes around us, and a seeming drift of small pieces to the southeast through the small water spaces. The rigging is one mass of snow and frost, presenting a beautiful sight; but as we are more interested in progress than in beautiful sights it has but little charm for us. The pack ice surrounding us seems to have a uniform thickness of about seven feet, — two feet being above the water. It is somewhat

hummocky, but I do not observe any hummock greater in height than six or seven feet. New ice has made around the ship during the night, the temperature standing at 29° during the night and up to eight A. M. Sounds as of surf heard to southeast indicating open water in that direction.

At two P. M. the fog cleared away, and we spread fires at once and got under way. The greatest amount of water space seeming to be to the northeast, we made our way in that direction generally, and at 4.30 we succeeded in getting out of the pack into the open sea; that is, comparatively open, because the pack extended from southeast around by west to north, while only to the eastward was there open water. Upon reaching this open water we passed a drifting tree that seemed to have been torn up by the roots, but, more important still, land was sighted at 4.30, bearing W. N. W. true. From the reckoning we have been able to keep of our position, this land is Herald Island, discovered and landed upon by Captain Kellett, of H. M. S. Herald, in 1849. Not caring to put the ship in the close pack which appeared to the northward of us and lose sight of Herald Island without advancing materially, I slowed the engines and kept the ship turning round in circles for the night, just clear of the ice. According to our position we were about forty miles from Herald Island, and as it was very much distorted by mirage we could not make a closer estimate of the distance. Wind dogs around the sun at setting, but a beautiful moonrise gave promise of a fine night.

September 5th, Friday. — A clear and pleasant day throughout, with light northerly breeze. At four A. M. spread all fires and got a full head of steam, and entered the pack through the best looking lead in the general

direction of Herald Island. For the first two hours we had but little trouble in making our way, but at six A. M. we commenced to meet young ice ranging from one to two inches in thickness in the leads, and seemingly growing tougher as we proceeded. We ground along, however, scratching, and in places scoring and cutting our doubling, until 8.40 A. M., when we came to pack ice from ten to fifteen feet in thickness, which of course brought us up. Anchored to the floe to wait for an opening.

During the forenoon there were several occasions when we distinctly saw land beyond and above Herald Island, as well as to the southwest of and beyond it. I should at first have been inclined to think that the land above and beyond Herald Island was a kind of false island made by the mirage; but as the land seen to the southwest of Herald Island was in the shape of high sugar-loaf snow-topped mountains with clearly defined edges, such as could not have been caused by mirage, for there were no hummocks in our floe horizon to be thus distorted, I am strengthened in my belief that we really saw the land. Its distance is impossible even to estimate. Looking across the ice disturbs one's belief in his accuracy in measuring distances by the eye. For instance, on board ship we generally agree as to the distance of an object at sea; but here in the ice no two estimates correspond. We put the distance of this land seen beyond Herald Island at various limits, ranging between forty and one hundred miles; and though since sighting Herald Island last night we have steamed towards it twenty miles, one half the estimated distance, but few of us agree as to its distance now. We range from ten to forty miles. At one P. M., seeing another chance to make a mile or two, we got up steam

and worked ahead through thin, new ice, and between detached pieces of floe. At four we anchored again to a floe, and banked fires. Our sides, on the doubling, are scraped bright, and scratched and cut to some extent, but they are the scars of honorable wounds received in action with the ice.

September 6th, Saturday. — This is a glorious country to learn patience in. I am hoping and praying to be able to get the ship into Herald Island to make winter quarters. As far as the eye can range is ice, and not only does it look as if it had never broken up and become water, but it also looks as if it never would. Yesterday I hoped that to-day would make an opening for us into the land; to-day I hope that to-morrow will do it. I suppose a gale of wind would break the pack up, but then the pack might break us up, and that is not to be desired. This morning shows some pools of thin ice and water, but as they are disconnected, and we cannot jump the ship over obstructions, they are of no use yet to us. A thick fog hangs over everything, even the island. A light northerly wind with a steady barometer, and a temperature ranging between 23° and 32°.

At one P. M. the fog lifted, and we saw a chance of making about a mile toward the island. Spread fires again and commenced forcing our way, ramming wherever we were opposed, and with good effect. Of course, ramming a ship through ice from ten to fifteen feet thick was impossible, but wherever a crack or narrow opening showed between two floes, even of that thickness, we could by judicious ramming, and backing and ramming again, shove them apart enough to squeeze through. Our steam-winch did good service, for we could easily snub the ship's head into a weak place when we did not have room to turn her with the helm. At

ENTERING THE ICE.

4.20, however, we had come to solid floes again, and as the thick fog again shut in we came to with our ice-anchor. Wishing to save even the coal we used with banked fires, until a good chance presented itself for going ahead, I let the fires die out. This evening three bears came down to about a mile from the ship, but fled upon being seen and chased by our hunters. Served out snow-goggles to all hands, with orders to wear them.

September 7th, Sunday. — A day of complete rest in every respect. The day begins with snow, clears, becomes and ends foggy. Ice moving a little, and ship seemingly moving to N. W. At ten A. M. muster the crew, read the Articles of War, and hold divine service. At twelve got soundings in forty fathoms blue mud. In the watch from eight to midnight, experienced a slight pressure on the starboard beam, shoving the ship up on a tongue of ice on the port side and listing her to starboard about five degrees.

September 8th, Monday. — At 1.30 this morning the ship righted again. Thermometer ranging between 22° and 28°. Forenoon foggy; afternoon clear. No sign of a lead in any direction. The northerly winds seem to have cemented the ice into one enormous pack. Soundings at noon in thirty-six fathoms blue mud. The ship has evidently moved since yesterday, when we had forty fathoms. In the first watch the ship heeled again to starboard about 9°, and jammed the rudder hard a-starboard.

Lest at any time the question be asked why I do not unship the rudder and screw at this time, I will record here my reasons. Our rudder is unusually strong and heavy; and though it is a simple matter to unship it, it will be an exceedingly difficult matter to ship it again

unless we have plenty of open water under the stern. If I trice up the screw now, ice will surely form in the clutch and prevent the screw from getting back in place. If I expected the ship to remain in this spot all winter, these reasons would have less weight. But as I consider it an exceptional state of the ice that we are having just now, and count upon the September gales to break up the pack, and perhaps open leads to Herald Island, I want the ship to be in condition to move without delay. Besides, I am told that in the latter part of September and early part of October there is experienced in these latitudes quite an Indian Summer, and I shall not begin to expect wintering in the pack until this Indian Summer is given a chance to liberate us.

September 9th, Tuesday. — A superb day; bright sunlight, thermometer ranging between 21° and 25°. No sign of a lead in any direction. Established our position to be by observation, 71° 35′ N., 175° 5′ 48″ W. At 7.30 P. M., with a sunset entirely free from clouds, made out land distinctly between S. W. and W. and S. S. W. The land furthest to the westward was a kind of table land, with a range of peaks to its southward, terminating in a low, flat strip just behind Herald Island. And this is the land which, two months ago yesterday, we sailed for from San Francisco, hoping to explore this winter. Man proposes but God disposes. Here we are not even able to get to Herald Island. Ship still heeled 9° to starboard, and great pressure on the rudder casing. This must be eased or we may damage the pintles. We have been trying all day to explode torpedoes under the stern, but our slow-match was defective and would not burn, and we could not get an electric current through our non-insulated copper wire. During the last three days have turned the dogs

out on the ice, from daylight to dark, as much to their satisfaction as to ours: to theirs, because they can run around with more freedom; and to ours, because we can keep the ship clean again. As we set bear-traps every night, we call the dogs on board ship to prevent accident. Though each morning we see the undoubted traces of bears, the traps seem to have been avoided.

September 10th, Wednesday. — Calm from midnight to noon, with fog, mist, and snow all day. Lowest temperature 16°, highest 25°. In the hope of helping the ship to right herself, got two tackles up, one at the foremast head, and one at the mainmast head, hooking them to ice-claws and setting them well taut. Broke away the ice around the stern and attempted sawing with ice-saws, but with no other effect than to bend up the saws. The soundings of the past few days have steadily decreased: forty, thirty-six, thirty-five, thirty-two and a half fathoms. The whole pack, with ourselves fast in it, is evidently drifting; but whether the shoaling in soundings indicates an approach to Herald Island or not cannot be proven until we get observations again for position. Not a sign of a lead in any direction.

September 11th, Thursday. — The ship has not righted any during the night. An examination of the ice around the stern this morning shows that we are between two floes about fifteen feet in thickness. The ice on the port side of the ship has been broken on its upper edges and piled up irregularly fore and aft, while on the starboard side (toward which the ship heels) the surface is smooth and unbroken. The strain brought on the rudder by the nip has "broomed" up the port side of the rudder post and rudder casing, and I am reluctantly forced to the conclusion that we must unship it. A more severe nip might break the gudgeons or

bend the pintles, and we might not only lose our rudder, but lose the means of shipping the spare one. Accordingly the rudder is unshipped (with great difficulty, owing to the small water space) and triced up to its davits, across the stern. A thick mist prevented us from seeing the island all day. Soundings at noon in twenty-nine fathoms, light blue mud. Still shoaling. Leaving the lead on the bottom, we were carried away from it toward the northwest.

At last caught something in the bear-trap, but it was unfortunately one of our finest dogs. He was caught by the fore-leg, the tooth of the trap catching between the bones without breaking them, and I hope we shall soon have him all right again. Turned the starboard side of the bridge into a dog hospital, and turned the dog in for repairs.

September 12th, Friday. — The day opened and continued calm and misty with occasional flurries of snow. The only thing to break the monotony was the catching of another dog — our largest, Kasmatka — in a bear-trap. Now that the dogs have learned the way to the traps there is danger of one of them being caught every day; and I consequently ordered the traps to be taken in. Fortunately neither of the dogs caught have had any bones broken or any serious injury inflicted; but we cannot afford to have any of them laid up during the working season.

This inaction is most disagreeable, and it is even more disagreeable to see no chance for a change. The only hope of the pack breaking up is the occurrence of a gale of wind; and as the weather has been so uniformly calm and pleasant since our being beset that the ice has become well connected and solidified, it will require a heavy gale to make a change. Meanwhile, we

are getting no nearer Herald Island, and are making no advance in any direction, unless we are really drifting, ice and all, to the N. W. It is unpleasant to realize that our exploration for a whole year should come to a stop on the 6th September, and that at a point which a sailing ship, the Vincennes, reached in 1855 without any difficulty. And here we are in a steamer, and beset in the pack before we are two months out of San Francisco. My disappointment is great, how great no one else will probably ever know. I had hoped to accomplish something new in the first summer, and we have done nothing. While waiting for next summer we are consuming our provisions and fuel, and running the risk of the enfeeblement of the general health which a winter's confinement may produce.

There is a bare chance of there being drift-wood on Herald Island to help us out in the matter of fuel, and as this is an important matter, I conclude to send a sledge party toward the island to get information. Chipp, therefore, is ordered to prepare for a journey, and accompanied by Melville, Dunbar, and Alexey, to take a sledge and eight dogs to proceed toward Herald Island to-morrow morning at eight o'clock. It is just as well, also, that I should know something about the ice between the ship and Herald Island, and the existence of some harbor into which the ship might be, by some happy circumstance, secured for the winter, if there is to be no further advance for us this season. In making preparations for the sledge journey the day ends.

September 13th, Saturday. — At eight A. M. the sledge party leaves. We are all on deck to see it start, the colors are hoisted, and we cheer the little party as it moves off, the dogs in high glee, dragging the sled

rapidly along after Alexey, who runs and dances before them. We are now brought face to face with another difficulty: where are we to get water to use without expending our fuel in distilling? The ice all around the ship gives water that is unmistakably salt, and our searches thus far cannot succeed in finding ice sufficiently free from salt to be non-injurious to the consumers. Even the snow gives evidence of salt to too great a degree for use; and as we have seen no icebergs at all (in fact no one else has seen them north of Behring Strait), we are without any of the fresh water ice met with in Smith's Sound and Baffin's Bay. Taking Dr. Ambler with me, two sleds, and men with axes, I started off this evening on a search for better ice. About a mile and a half from the ship to the westward we came to a large lump of ice on end on the floe, which, upon being tested by the application of nitrate of silver to a melted portion, shows the presence of from three to five grains of chlorine to a gallon of water. As this is the least objectionable we have found I conclude to use it until we find better, or have rigged some economical apparatus for distilling. Our coal account calls for one hundred and eleven tons, and we must economize so that we shall have enough to work with next season. If our consumption is too great this winter, we must work under canvas and do without steam next summer.

September 14th, Sunday. — At 8.30 we were pleased at sighting the sled party returning, and at nine we welcomed them on board. Chipp reports to me that when about seven miles from the ship he found much lighter ice than the ice-field we are now in, it being composed of floe pieces cemented together by young ice, in many places just strong enough to bear the weight of

the sledge and party. At ten miles from the ship he came to a broad lead, one half mile wide, extending E. and W. as far as eye could reach, with open lanes extending in S. E., S., and S. W. directions. Here the ice was different again, showing evidences of severe pressure. The old floes were closer together, and the young ice was broken and forced up into ridges of eight to twelve feet in height. He followed the edge of this lead to the westward a mile or so, when it turned up to the N. W., with an edge of soft and rotten ice. The ice around Herald Island appeared to be rotten and cut up with leads. The point of view was about fifteen miles from the ship and five miles from the island. The shore was high and rocky, apparently cut in deep ridges, running down the face of nearly perpendicular sides. He saw no place that would offer any protection to a ship. He saw no drift-wood, but sighted many bear-tracks, and one raven, and one young seal which Alexey shot and brought to the ship. There seems to be but one way out of our situation. A heavy gale is wanted to break up this field of ice we are in, and to give us a chance to make our way toward the land which we saw beyond Herald Island. Failing this we must winter in the pack. Herald Island will be of no use to us, even if we could get to it; but we daily seem to be increasing our distance from it by drifting to the N. W. We must hope for observations to give us our position to determine whether we have actually moved or not. At 10.30 A. M. inspected the ship and held divine service.

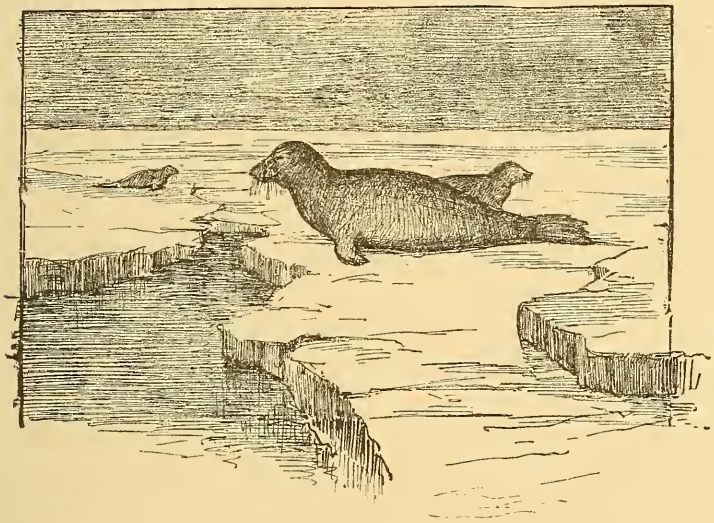
September 15th, Monday. — Mr. Danenhower succeeded to-day in determining our position by observation. We were at noon in latitude 71° 46′ N., longitude 175° 36′ W., and comparing this position with that of

the 9th inst., we have changed fifteen miles to N. 40° W., or at the rate of two and a half miles a day. Even at this rate, if we continue, we may reach Kellett Land or its continuation before spring. This is of course but a faint consolation, but it seems our only one, for from the mast-head we can see nothing but a field of ice. If there is a continuous current in this part of the world, we shall probably test it by our drift this winter, and perhaps drift toward some new land, as did Weyprecht and Payer, in the Tegetthof. As to making any progress with the ship by our own efforts, I see no chance; and it looks as if it would take an earthquake at least to get us out of our besetment. However, "the darkest hour is just before the dawn," and our dawn may be soon coming.

To prevent the water from freezing in the boilers and bursting the tubes and pipes, we to-day emptied them, broke joints, and drained all pipes. If I were certain of staying here all winter, there is much more I should like to do. Our decks are so fearfully lumbered up as to be a sure preventive to our keeping in order. To put up our deck-house, the steam-cutter and spare rudder should be removed. But where shall they be put? If we place them on the ice we may lose them in a break-up, if a break-up comes, and we certainly have no place for them on board ship. I suppose, however, they and many other things must take their chances on the floe this winter.

Both of our wounded dogs are improving, and, having discharged themselves from the bridge hospital, have gone to their brethren on the ice. Our bridge has answered several purposes thus far for which it was not constructed; for Alexey and Aneguin, being overcome by the heat of the berth-deck stove, have rigged

a tent-like covering over the port half of the bridge, and moved in. To-day we feasted in the cabin on the young seal which Alexey shot, and we unanimously pronounced it equal to rabbit. We have again set our bear-trap, baited with seal's entrails, and have placed it so far from the ship that we hope the dogs may not find it.



Seals.

September 16*th, Tuesday.* — The day opens and continues with a light, southerly breeze; the temperature is from 20° to 30°. During the morning watch land was distinctly seen bearing from W. by S. to S. (both true). However we may be drifting, we are certainly getting more land in our horizon than formerly, and Herald Island is beginning to lose some of that distinctness which made us declare at first that it was only five miles distant. It is only on rare occasions that we see this far off land, and it is impossible to estimate how far off it is. If Herald Island, which we estimated

originally at five miles distance, proved to be between twenty and twenty-five, land which we estimate at sixty miles would prove to be, — I do not care to hazard a guess. At twelve we were able to determine our latitude to be 71° 49′ N. We were unable to get sights for longitude owing to cloudy sky in forenoon and afternoon, so we know only that we have gone to the northward four miles in one day.

In the hope of securing better drinking water for our use Melville has placed in the water kettles on the cabin and forecastle stoves a ground tier of charcoal. It is an experiment to be sure, for we cannot hope that the charcoal will absorb salt.

September 17th, Wednesday. — A most exciting day. Early in the morning Lieutenant Chipp and Mr. Dunbar went out to have a look at the bear-trap, and they came back at nine to inform me that a bear had evidently been caught in the trap, and had succeeded in breaking it away from the ice and carrying it off with him. Adding Melville to the party we at once set out in pursuit. Reaching the place where the trap had been set, one mile from the ship, we had no difficulty in finding the bear's tracks and following his trail, for the trap made a broad mark, easy enough to trace, even if the drops of blood had not been sufficient. We saw also the tracks of two other bears, one on each side of the entrapped one, as if two friends had remained by him to encourage him in his retreat. We had a long tramp of nearly six miles in the chase. Being somewhat heavily clad and suffering from the heat I had fallen a little behind the others, when I heard a bear howling as if in pain. I ran forward, but the others had already sighted the game and opened fire, and I reached the scene of action in time only to

give the *coup de grace* to the bear entangled with the trap.

Instead of three bears there were but two, a male and a female. The male had only one toe of the left forefoot caught, and yet had managed to break the trap adrift and carry it away without dragging his toe off. He might have left us to make a longer chase had not the chain caught between two small hummocks and anchored him. The female made no attempt to desert him, but ran ahead and back to him as if to coax him on. Upon sighting us both rose on their hind legs and howled dolefully, but the thing was soon over. Chipp and Dunbar with Winchesters, and Melville with his Remington, left me only a finishing shot at one bear.

Hoping that we might get a sight of the third bear whose tracks we had seen, Melville and I remained with the dead, while Chipp and Dunbar returned to the ship to send out men and sleds to carry back the prize. They left us at 11.30 and reached the ship at 12.45. At 2.25 three sleds came out to us, and nearly all hands accompanied them, the afternoon being turned into a holiday for the crew. We quickly rigged up sheers and weighed our bears. The male weighed 580 lbs. and the female 422 lbs. Next we had the two bears photographed by Mr. Collins, and then they were skinned, cut open and dressed, and the meat and skins loaded on two sleds, our beam scale, sheer legs, and photographic gear occupying the third. While on the ground Mr. Newcomb shot several ivory gulls and added them to his collection. We set both of our bear-traps, baiting them with bears' entrails, and after catching a man (Manson) promptly in one of them, without accident fortunately, we set out at 4.10 P. M. on our return journey, reaching the ship at 5.25, after a drag of

three and a half miles, all hands jubilant and happy as after a victory. This is a long article about two small bears, but they were our first, and our enthusiasm is pardonable.

Danenhower had excellent chances to get observations to-day, and he establishes our position to be lat. 71° 50′ N., long. 175° 25′ W., and our drift in the last two days seven miles to N. E. by E. and a quarter E. Soundings at noon in thirty-five and three fourths fathoms blue mud. At sunset the weather had an ugly, threatening look.

September 18*th*, *Thursday.* — The day opens with a fresh breeze from S. E. which gathers strength, and the temperature rises from 30° to 35°. The effect upon the surface of the ice is to make a great deal of sludge and several small pools and ponds. No perceptible change in our position, but I have no doubt the ice is moving to the N. W., and carrying us with it. If this weather continues there may come a liberation for us, "a consummation devoutly to be wished."

The ice is proving too salty for cooking and drinking purposes, and we have fallen back upon melted snow. Occupied the men to-day in altering and lengthening our sleeping bags, which are too short and too cramped at the feet. Soundings at noon in thirty-six fathoms blue mud. Bring in our bear-traps lest we should lose them by the ice breaking up.

September 19*th*, *Friday.* — The S. E. blow of yesterday continues throughout the night until noon, when the wind backs to E. S. E. and moderates. The barometer slowly falls to 29.55 and there stops. The weather all day is overcast and misty, with passing showers of rain. The temperature remains uniformly at 33° and 34°. At 8.30 A. M. Herald Island bears south

(true), and is very distant. The changes in appearance of this island have been slowly panoramic. We have crossed its face from east to west until its western end bore south, and have then steadily drifted away from it to the northward, so that from a panoramic view we have come to a dissolving view.

September 20th, Saturday. — The doctor informs me this morning that he has made during the night experiments on the berth deck, to determine the amount of carbonic acid while the men were asleep and breathing the atmosphere of the deck. The experiments were made with what is known as the "wet jar," and the result was as follows: In every thousand volumes of air there were two and thirty-two hundredths (2.3246) volumes of carbonic acid, which, reduced to a percentage, shows .23246 per cent. The records of the expedition of the Alert and Discovery show .436 per cent. on the berth deck of the Alert on February 29, 1876, and .482 per cent. in the ward-room on January 18, 1879, both observations being made under the very worst circumstances of housing and confinement. While, therefore, our showing is a very favorable one in comparison, still it is a bad one, for we are only in September, with a temperature mild enough to leave open every access to the fresh air.

To experiment still further in this matter, and to prevent the willful or accidental closing of any doors or the sky-light of the berth deck, and to endeavor to prevent any serious amount of carbonic acid in the ward-room and cabin, I issued to-day orders in regard to the ventilation of these apartments. While these orders are being carried into effect, experiments will determine their efficiency in accomplishing the desired result.

The measurements taken by the doctor to determine the cubic air space per capita show that we are deficient in that respect also. The berth deck is only 78 cubic feet, the ward-room 180, the cabin rooms 333, and the entire cubic air space of the cabin amounts to 1,500 feet. In the Alert the cubic air space per man was 107, and in the Discovery 140. The comparison is again unfavorable. The cubic air space will be increased for the men when we come to build our deck-house, and I hope the carbonic acid gas will largely disappear in that edifice.

All these things, and the disappointment at having accomplished so little the first season, give me enough to think about. There is nothing, however, but patience and earnest effort to improve matters that will avail me anything, and to these two things I must devote myself.

The result of the S. E. blow and the mild temperature has been to open lanes in our immediate neighborhood, but none of them are of any great extent, and the heavy pack shows across the openings which are not more than fifty feet wide. If we were not securely held between two floes, I would move into one of these leads, even if we advanced only half a mile. (We would have moved at all events and have broken the monotony.) But we are securely held as in a vice, and heeling 5° to starboard. Soundings at noon in forty fathoms blue mud. We are now increasing our depth as we increase our distance from Herald Island. Brought up some new specimens with the dredge.

September 21*st*, *Sunday*. — At the usual Sunday inspection held by me to-day, I concluded to make some changes in the internal arrangements of the berth deck. The order of yesterday about keeping the doors open

leading from the old galley-room to the berth deck must be modified, as the cold is too great at night and causes the men to complain sadly. We therefore bored sixteen $1\frac{1}{8}$ inch holes in the lower panel of each door, which I hope will insure a proper supply of fresh air.

Nindemann has up to this time occupied a cot hung in the old galley-room. In order to move him into the forecastle, I order a man transferred from one of the after berths to one of the vacant forward ones. This brings the transferred man too near the stove, which is in the eyes of the ship, and we must move the stove to the middle of the berth deck and carry the mess table forward. These additions to the carpenter work of the ship necessitate taking Nindemann off watch and adding him to the carpenter gang. During past week the engineer's force has been employed in scaling and cleaning the port boiler, and overhauling and laying up the engines. The coal return for the past week is as follows: —

Galley . . .	1,000 lbs.	= daily average,	$142\frac{6}{7}$ lbs.
Cabin . . .	360 lbs.	= daily average,	$51\frac{3}{7}$ lbs.
Berth Deck .	440 lbs.	= daily average,	$62\frac{6}{7}$ lbs.
Total, . .	1,800 lbs.	= daily average,	$257\frac{1}{7}$ lbs.
Amount of coal remaining on hand, .			$110\frac{13}{240}$ tons.

As coal is the most precious article which we have on board ship, its economical use is a matter of paramount importance. To bring about the utmost economy, I have concluded to put the whole affair in the charge of Chief Engineer Melville, and to give him entire cognizance of all stoves, the galley, and the issue and expenditure of fuel. I have therefore given him a written order to that effect.

At 10.30 A. M. perform divine service. At noon we

obtain our position by observation, — latitude 72° 10′ 23″ N., longitude 175° 26′ 22″ W., — and from this position we establish the fact that in four days we have drifted twenty miles to the north, one degree west, or at the rate of five miles a day. Herald Island is almost a thing of the past. It is now but a small patch in the horizon, difficult to separate from the intervening hummocks. From ten to eleven P. M. have a fine aurora. The ship still altering her heading in the last twenty-four hours from S. W. and ½ S. to W. by N., both magnetic.

September 24th, Wednesday. — At two A. M. the thermometer registered 7°, our lowest thus far, and the temperature gradually rose until at noon it reached 24°, and remained nearly the same to close of day. Obtained to-day longitude only, — 175° 21′ W., — showing a drift of seven miles to the east in two days.

This drift of ours is in no sense uniform or capable of being foreseen. It does not depend seemingly upon the wind, for it is different with the same winds at different times. That even light winds occasion drift and pressure is evident from the fact that the ice about a mile from the ship in all directions is constantly assuming new shapes. We seem to be held in the centre of a large floe, sufficiently strong to save a severe nip to the ship and to resist pressure on its edges. A mile from the ship in any direction new ice six inches thick is piled up in tables from six to twenty feet in height by the coming together of floes. One day we find large spaces of water, the next day we find the spaces narrowing, and the third day the spaces are closed and slabs of new ice six inches thick are piled up on end like a confused fence six, twelve, and eighteen feet high. We seem to move only in azimuth, remaining

heeled over to starboard 5°. Our floe suffers no jar even, and immediately around the ship the conditions of ice do not change, except as snow-falls level all the projecting surfaces.

An occasional gull is all that we see, and each day the number seen diminishes. Occasionally a seal appears in an open pool, and is fired at without success. According to Alexey, a seal hit in a bone will sink or die under the ice, — an explanation for several hits failing to secure the seals struck. The experiment for carbonic acid on the berth deck since the boring of the auger holes in the door and the moving of the berth deck stove show an improvement. Last night's figures give 1.8012 volumes of carbonic acid per one thousand volumes of air, or .18012 per cent.

September 25th, Thursday. — At 1.50 A. M. a very curious electric phenomenon was observed. A ball of electric light formed about one quarter mile from the ship on the surface of the floe (in size about that of "a barrel," according to Mr. Dunbar), throwing out rays in all directions, and slowly rose and worked away from the ship, decreasing in size and brilliancy. When almost extinct it advanced again, increasing in brilliancy, and, descending to the floe, disappeared. This occurred twice in seven minutes. The appearance of the electric ball was preceded by a fine aurora. Unfortunately Mr. Dunbar, who had the watch, did not call me to see this extraordinary occurrence. Mr. Collins was called, but before he came on deck the display was over. The foregoing is made from Mr. Dunbar's description.

At 5.40 P. M. land is sighted bearing S. by W. and ½ W. true ; and although mirage has distorted its outline into an unknown and unrecognized shape, I am quite

sure it must be Herald Island. All sign of bird life seems to be gone. On rare occasions a gull is seen, but only in the neighborhood of a water-hole, and these water-holes are growing extremely rare. One bear-track was sighted this afternoon to our satisfaction, for we had begun to fear that bears too had disappeared with the birds. Not a bear-track has been seen save this one since our capture of the 17th inst.

September 28th, Sunday. — Snowing pretty much all day. At ten A. M. inspected ship and had divine service. In the afternoon Mr. Newcomb and Alexey shot two female walruses about two and one half miles from the ship, weighing about one thousand pounds each. Sent out the dogs and dragged them in, one after the other, gaining a valuable addition to our dog food. One of the females was with young, and I have directed Mr. Newcomb to save the fœtus. He will also save the skin of one in order to mount it on our return, and the head of the other for mounting on board ship. The wisdom of having one officer look out for our fuel is evident. The coal report shows a saving of three hundred and seventy-five pounds in the past week.

September 30th, Tuesday. — The month ends with a full moon, but beyond an occasional view of it through drifting snow it has not been of much comfort. It makes but little difference, however, because we have so much sunlight that we can be very independent; but I suppose the time will soon come when we shall consider the moon our best friend, and watch anxiously for her advent.

Our drift since last observation (26th inst.) has been five miles S. W. by W. We seem to swing around a kind of an irregular triangle, independent somewhat of local circumstances of wind or current. After our first

besetment we had a positive drift to the northward, and then an equally positive drift to the eastward (making two sides of the triangle), and now we seem to begin the third side leading back to the beginning. Either we are in a kind of dead-water back of a current, or the floe in which we are caught is loose among a lot of surrounding fields of ice, and we carom from one to the other. On our clearest days we can see no land, else I might hope that we had drifted into a pocket between two islands or two continents, and might probably remain thereabouts until spring.

The meteorological observations have shown several times of late that the water at the bottom has been from one and one half to two degrees colder than at fifteen fathoms, and the water less dense. Mr. Collins argues from this the existence of a warm current at fifteen fathoms, but until the change in temperatures is more decided I shall withhold my acquiescence in that opinion.

In order to have an exact estimate of the amount of food consumed by the crew and officers, and to place it upon record in case of any inquiry hereafter, I have caused an exact account to be kept of the meals for the past week, and will enter it here. The food here mentioned has been served out regularly since leaving San Francisco (with the exception, of course, of bear meat, and in its absence some preserved meat has been supplied), and the bill of fare for one week will serve as an index to the whole. We have still a large quantity of fresh potatoes, and a small quantity of fresh carrots and onions, so that for some time we shall not be down to our strict ration table. When all our fresh vegetables are gone, another week's meals will be entered as a sample. We keep our vegetables from freezing by stowing them in a coal bunker.

BILLS OF FARE FOR PRECEDING WEEK.

Articles marked with an X were given to officers' mess only. Pepper, salt, molasses, vinegar, mustard, and sauces not mentioned.

Wednesday, September 24, 1879.

BREAKFAST.

Beef	8 lbs.
Potatoes	20
Fresh Bread	11
Butter	$2\frac{1}{16}$
Coffee	$2\frac{1}{16}$
Sugar	$2\frac{1}{16}$
	$45\frac{3}{16}$

DINNER.

Pork	33 lbs.
Beans	16
Tomatoes	10
Potatoes	5
Pickles	$2\frac{6}{16}$
Flour for Duff	16
Raisins	4
Hard Bread	13
	$99\frac{6}{16}$

SUPPER.

Bear Meat	18 lbs.
Peach Butter	$3\frac{1}{2}$
Green Gages X	3
Potatoes	15
Tea	1
Sugar	$2\frac{1}{16}$
Butter	$2\frac{1}{16}$
Fresh Bread	11
	$55\frac{10}{16}$

Total number, 33; total weight, $200\frac{3}{16}$; average per man, 6 lbs. 1 oz.

Thursday, September 25th.

BREAKFAST.

Haddock X	4 lbs.
Corn Bread X	12
Pork	7
Potatoes	15
Coffee	$4\frac{1}{8}$
Sugar	$4\frac{1}{8}$
Milk	$\frac{1}{2}$
Bread	15
Butter	$2\frac{1}{16}$
	$63\frac{3}{16}$

DINNER.

Bear Meat	24 lbs.
Soup	7
Pork	4
Corn	12
Potatoes	12
Hard Bread	5
	64

SUPPER.

Mutton	$7\frac{1}{2}$ lbs.
Ham X	3
Potatoes	12
Peach Butter X	$1\frac{1}{2}$
Dried Apples	$3\frac{1}{2}$
Butter	$2\frac{1}{16}$
Sugar	$4\frac{1}{8}$
Tea	$2\frac{1}{16}$
Milk	$\frac{1}{2}$
Bread	15
	$51\frac{1}{4}$

Total number, 33; total weight, $178\frac{11}{16}$; average per man, $5\frac{1}{2}$ lbs.

Friday, September 26th.

BREAKFAST.

Codfish	12 lbs.
Mackerel X	4
Hominy	7
Potatoes	15
Bread	10
Sugar	$3\frac{2}{16}$
Coffee	$4\frac{2}{16}$
Butter	1
Milk	$\frac{1}{2}$
	$56\frac{3}{4}$

DINNER.

Salt Beef	32 lbs.
Tomatoes	10
Potatoes	15
Hard Bread	8
Flour	3
Pumpkin X	1
Lard	1
Sugar	2
Milk	1
Split Peas	8
Bacon	2
	83

SUPPER.

Bear Meat	18 lbs.
Potatoes	15
Prunes	5
Bread	10
Tea	1
Sugar	$3\frac{2}{16}$
Milk	$\frac{1}{2}$
Butter	1
	$53\frac{10}{16}$

Total number, 33; total weight, $193\frac{6}{16}$; average per man, 5 lbs. 13 oz.

Saturday, September 27th.

BREAKFAST.

Beef	8 lbs.
Potatoes	20
Sugar	$4\frac{1}{16}$
Milk	$\frac{1}{2}$
Coffee	$4\frac{2}{16}$
Butter	1
Bread	10
	$48\frac{5}{16}$

DINNER.

Beef Soup	12 lbs.
Mutton	15
Macaroni	4
Tomatoes	6
Cheese	2
Potatoes	10
Hard Bread	10
	59

SUPPER.

Beef	8 lbs.
Kidneys X	2
Potatoes	15
Quince Butter	5
Bread	15
Tea	1
Sugar	$4\frac{1}{16}$
Milk	$\frac{1}{2}$
Butter	1
	$51\frac{9}{16}$

Total number, 33; total weight, $158\frac{14}{16}$; average per man, 4 lbs. $12\frac{2}{3}$ oz.

Sunday, September 28th.

BREAKFAST.

Beef	8 lbs.
Oat Meal	7
Potatoes	15
Bread	10
Sugar	$4\frac{1}{16}$
Coffee	$4\frac{2}{16}$
Butter	1
Milk	$\frac{1}{2}$
	$49\frac{11}{16}$

DINNER.

Ox-Tail Soup	12 lbs.
Roast Bear	26
Pork	4
String Beans	12
Potatoes	10
Beets	$4\frac{1}{2}$
Jelly	$\frac{1}{2}$
Hard Bread	1
Raisins	3
Flour (Duff)	16
	89

SUPPER.

Mutton	8 lbs.
Potatoes	15
Damsons	6
Pears X	2
Flour	6
Yeast Powder	$\frac{1}{4}$
Ginger	$\frac{1}{4}$
Bread	15
Sugar	$4\frac{1}{16}$
Tea	1
Milk	$\frac{1}{2}$
Butter	1
	$59\frac{1}{16}$

Total number, 33; total weight, 197$\frac{2}{16}$; average per man, 6 lbs.

Monday, September 29th.

BREAKFAST.

Beef	6 lbs.
Mutton	3
Bread	20
Sugar	4$\frac{1}{16}$
Butter	1
Coffee	4$\frac{2}{16}$
Milk	$\frac{1}{2}$
Potatoes	5
	43$\frac{2}{16}$

DINNER.

Mutton Broth	12 lbs.
Roast Beef	14
Tomatoes	6
Okra	4
Potatoes	15
Hard Bread	5
	56

SUPPER.

Bear Steak	20 lbs.
Potatoes	15
Bread	15
Sugar	4$\frac{1}{16}$
Butter	1
Milk	$\frac{1}{2}$
Tea	1
Dried Apple	5
	61$\frac{2}{16}$

Total number, 33; total weight, 161$\frac{1}{4}$; average per man, 4 lbs. 14 oz.

Tuesday, September 30th.

BREAKFAST.

Bacon	13 lbs.
Hominy	7
Potatoes	15
Bread	10
Coffee	$4\frac{12}{16}$
Butter	1
Sugar	$4\frac{1}{16}$
Milk	$\frac{1}{2}$
	$55\frac{5}{16}$

DINNER.

Beef Soup	12 lbs.
Roast Bear	26
Pork	4
Potatoes	15
Hard Bread	5
Onions	3
Gooseberries X	$1\frac{1}{2}$
Lard	$\frac{1}{2}$
Flour	1
	68

SUPPER.

Beef	8 lbs.
Potatoes	15
Bread	15
Tongue X	3
Tea	1
Sugar	$4\frac{1}{16}$
Milk	$\frac{1}{2}$
Duck X	$1\frac{1}{2}$
	$48\frac{1}{16}$

Total number, 33; total weight, $171\frac{6}{16}$; average per man, 5 lbs. 3 oz.

DAILY ROUTINE.

September 6th to September 21st.

4 A. M.	Call ship's cook.
6	Call all hands. Coffee.
6.30	Turn to. Clean decks. Wash clothes. Break ice in fire-hole. Execute morning orders.
7.30	One watch to breakfast.
8	Other watch to breakfast.
8.30	Turn to. All hands on deck when any particular work to be done, otherwise one watch only.
10	Report berth deck ready for inspection. During forenoon the watch to provide ice or snow for making water, and attend to general work.
11.30	Soundings. Water temperatures at bottom and every fifteen fathoms, etc. Calculation of sea densities at same depths.
11.45	Lower dredge through fire-hole.
12 M.	Watch below to dinner.
12.30 P. M.	Relieve watches and other watch to dinner.
1	Turn to all hands, or one watch at work if necessary. Haul up dredge; examine and bottle contents.
4	Relieve watch.
5.30	Watch below to supper.
6	Relieve watch; other watch to supper. Watch peel vegetables. Collect all buckets and put them on quarter-deck near fire-hole.

8 P. M. Out galley fire; boatswain and carpenter report. Set anchor (?) watch of one man: watch lasting two hours.

9 Put out berth-deck lamp.

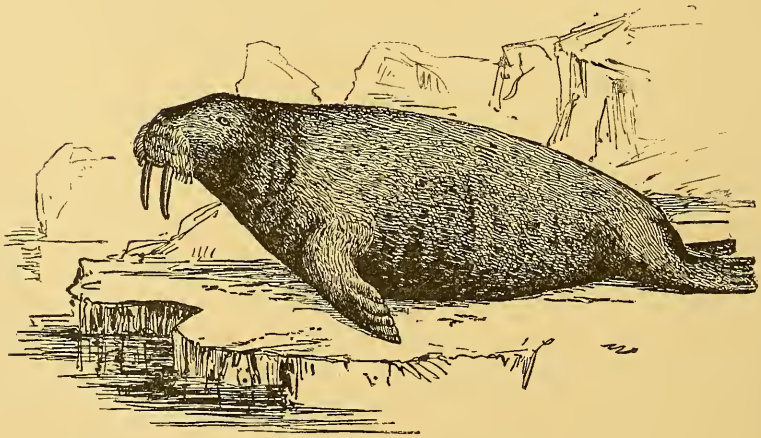
From September 22d to 30th the routine was changed to the following extent: —

7 A. M. Call all hands, ship's cook being called at 5 A. M.

One watch do the work before breakfast.

6.30 P. M. Out galley fire.

7 Boatswain and carpenter report.



CHAPTER V.

FAST IN THE ICE.

October — November, 1879.

Reappearance of Herald Island. — Condition of the Quarters. — Ross's Gull. — Moisture between Decks. — New Land in Sight. — Winter Routine. — A Beautiful Night. — Doctor Ambler's Dream. — Cracks in the Ice. — The Noises of Ice Cracking. — The Grinding. — Clear Water on the Port Side. — Necessity and Anxiety. — The Dogs. — Disappearance of the Sun. — Adrift from the Floe. — Distilled Water. — Arctic Beauty.

October 1*st*, *Wednesday*. — The day opened cloudy and snowing, with a stiff east northeast breeze, and a generally unsettled look about the weather, which promised a blow. For the first three hours the anemometer indicated a velocity of fourteen miles an hour, and the fourth hour it had increased to twenty-one miles an hour. It remained near this velocity until six P. M., when it increased to twenty-seven miles, and reached its maximum at eight P. M., of twenty-eight miles. From that time until the day ended it averaged twenty-four miles an hour, the wind since noon having backed to N. E. and N. true. Though the gale was from the northward and eastward, it was not accompanied by any low temperature particularly, the highest being 20° and the lowest 11°. It may be that there is open water to the northward of us of a warm temperature, and the wind blowing over it has had the chill taken off it before reaching us. The gale was accom-

panied with considerable snow, in perfect squalls, blowing like dust into every crevice and choking it up. While out for exercise it was next to impossible to see through the snow, and our tracks were filled as soon as made. Everything was one blinding mass of snow-dust.

October 2d, Thursday. — Went out in the afternoon to see the result of the gale. To the northward of us there was quite a space of open water, extending about three miles east and west and one half mile in width. Across the opening, ice could be seen in pack, and the floe, in which the ship was fast, seemed to be moving past it to the S. E. To the southward and eastward of us the same extent of open water was visible, and the surface of our floe was soft and mushy, making us sink frequently to the ankles.

October 3d, Friday. — Soundings at noon in 24½ fathoms blue mud and dark gravel. The dredge brought up some delicate white coral. This is a very interesting circumstance, for, unless this has been carried here by the warm waters of the Kurosiwo current, its presence can be accounted for only by natural growth, and I have never heard of coral forming in such cold waters as those we are now in.

To our great surprise, Herald Island was in plain sight this morning, bearing S. S. E. (true), and distant probably thirty miles. We have drifted to the S. W. of our last position, therefore, about thirty miles, or at the rate of ten miles a day. My remark about our drifting on the third side of the triangle is verified fully. Whether there is heavy ice impinging on land to the northward of us, which keeps our ice-field from advancing (in fact, caroms it back), or whether there is a regular S. W. current, I cannot yet say ; but it looks

now as if we were in a fair way to drift down between Herald Island and Kellett Land. In this case we may have some land near to us when the ice closes together and becomes immovable to a certain extent, and we may yet have the honor of being the first to land on this already discovered but yet unexplored shore.

At three P. M. we were startled into activity by the report of "A bear on the ice close to the ship!" Five or six of us immediately went in pursuit, spreading out to inclose the bear should he allow it. He had a long start, however, and most of us gave up the chase after a mile or two. Mr. Newcomb, Aneguin, and Alexey kept on, and at 5.20 Aneguin came back with the pleasant news that the bear had been overtaken and killed. Melville and I took a couple of sleds and teams and some men, and brought back the prize — a female bear, weighing, I should judge, about 500 pounds. The captors had already skinned and cut up the carcass, so we could not weigh it. This makes a valuable addition to our larder. The skin was nicely taken off with the head attached, and will no doubt be in good condition to be mounted hereafter.

October 5th, Sunday.— At ten A. M. read the Articles for the Government of the Navy, and mustered the crew. Everybody seemed in excellent health and spirits, and nothing disheartened by our being thus early beset and the almost absolute certainty of our wintering in the pack. The forecastle was dry, warm, and comfortable. Not a sign of moisture was to be found, except a trifle coming from the rods of the deadlights, and this was received and retained in the drip pans placed under them. The cook-house on deck was neat and clean. All the internal arrangements of lockers, water cans, and boxes being complete, the galley was as orderly as

a private kitchen. The two berths for steward and cook were neatly curtained off, and it would require a critical examination to reveal the fact that these two men slept there. The engine-room and shaft alley were clean and dry. The starboard boiler has been finished with its overhauling, and both boilers are now thoroughly scaled and ready for use. Instead of taking the engine apart for laying up, it has been kept intact; and as the engine-shaft can be disconnected from the screw-shaft, the engines can be turned over every day, moving all parts. The two shafts are connected by shoulders and four bolts, two of which are replaced as soon as the engine is turned over, and the other two are kept ready for immediately putting back. During the coming week the engines will be painted. The ventilation of the ward-room seems improved since the boring of the holes through into the cabin, and the keeping of a lighted lamp in the ward-room stove. In the cabin the air is good enough, except at night, when the wretched Walton lamp smokes so as to fill it. Melville has made a tin pipe four inches in diameter, perforated with half-inch holes, and fitted it into the skylight cover, and this works well without depriving us of the light. The frame of the deck-house is all up and the roof on. Nearly all the siding is in place, and during the coming week the ends will be closed in, the inside felted, and the electric engine and generator put together and tried with walrus blubber.

After inspection held divine service.

The coal account is satisfactory, showing even greater economy than last week, the fuel burned for heating and cooking being 1,280 pounds against 1,425 pounds consumed last week. Aneguin to-day added a seal to our provisions.

October 6th, Monday. — The events of the day can be summed up in a few words. Mr. Newcomb shot 28 ducks, and the observatory was erected on the floe about 100 yards from the ship, and lashed down to ice anchors. The work of the deck-house is progressing.

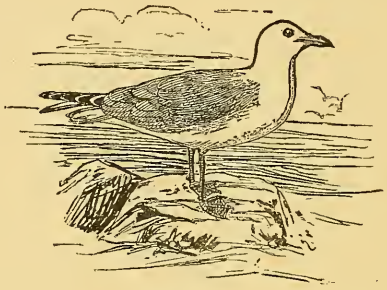
October 7th, Tuesday. — At times during the day a great deal of land was in plain sight, the most prominent bearing S. 54° W. (true). It appeared like a series of high lands sloping to low points, or a chain of islands. At intervals it would be greatly distorted by mirage, and again it would stand out hard and plain. Clouds could be seen above it and separated clearly from it. Towards sunset, when we had a perfectly clear background, these lumps of land stood out sharply defined against the sky, and were pronounced land unmistakably by those on board as well as by Melville and myself, who were three miles from the ship, on our daily run with a sledge and dog team. We may have something ahead of us in the way of exploration, this winter, after all.

Mr. Newcomb (who is indefatigable in his efforts to make a good collection of objects of natural history) added to his collection a "Ross's Gull," a most valuable prize and rare beyond calculation. In all Europe there is but one (at the Museum in Mainz), and there is no record of one in the United States.

October 8th, Wednesday. — In order to give the doctor more time to devote to preparing medicines for sledge journeys, and upon his representing that he thought he had more than his share of the meteorological work, and that he did not get sufficient sleep, I modified my meteorological order of August 7th so as to relieve the doctor of observing from eight P. M. to midnight, and assigned the first half of that watch

to Chief Engineer Melville, keeping the last half myself.

October 9th, Thursday. — The day opened with the continuation of the easterly blow of yesterday, and



Ross's Gull.

gradually tapered off to a light air, when at noon a shift to W. by S. (true) occurred, and a piping up of another gale, which settled finally in W. S. W. Highest temperature (with easterly wind) 31°, lowest temperature (falling with westerly wind) 6½° at midnight. Here is a curious fact: The weather until ten P. M. was snowy, and at that hour it ceased to snow, the stars came out, and at midnight both moon and stars were visible. Sounded at noon in 23½ fathoms blue mud, and the line showed we were drifting rapidly to the eastward before the westerly gale.

October 10th, Friday. — The curious fact of temperature recorded yesterday is repeated to-day. The temperature falls to 5½° with S. W. by W. wind, and promptly rises to 30° with S. E. wind. The harder the blow the higher the temperature.

October 11th, Saturday. — A stormy day with a southeasterly gale. At midnight light airs came up from the northward, and a faint radial display of the

aurora in the N. W., from which I anticipate an increase of barometric pressure, and a fall of temperature to-morrow. During the day and until the wind went to the northward, snow fell. We have not had thus far any unusually heavy snow-storm, but these high winds blow the snow that does fall up into drifts, through which we unexpectedly flounder over knee deep. We do not seem to be affected, as far as the ship is concerned, by these high winds; she heels steadily 5° to starboard, and occasionally changes her head a point either way, but that is of course due to a motion of the entire floe in azimuth. Beyond an occasional trembling as a sudden gust strikes her, the ship is as steady as if she were in a dry dock, shored up; and whatever pressure may be exerted on the edges of our floe, it does not extend to our position within it. What were leads behind and ahead of us when we first pushed the ship in here have long since frozen over and have been covered with snow, and we detect them in high temperatures, say 30°, by sinking through the snow to the sludgy ice beneath and seeing water ooze up from its partially thawing surface. Our floe drifts around of late to the S. W., and I very much hope that when these blows are over (for when the barometer rises first from its present low point 28. 77, we must surely look for high winds), and the air gets clear of driving snow, we shall have a good view of this land to the southwest of us. An indicated drift this time to the N. W.

October 14th, Tuesday. — During the clearing of the atmosphere at noon we saw land very distinctly to S. S. W. (true). As we have had no observations for four days I cannot speak with certainty when I say that this land is not Herald Island; but it had not the now familiar shape of Herald Island, and extended too far in

azimuth for that celebrated spot. The air is yet so filled with snow crystals that judging of distance is out of the question; and our view not lasting over a half hour, with intervals of concealment, we put off guessing to a more propitious moment. Discontinued the daily hauling of the dredge on account of the small amount of the proceeds and their sameness. Fired up again on the Baxter engine, but Edison's generator failed to make a light. I am afraid this is irretrievably worthless, and our electric light this winter has remained, not gone, "where the woodbine twineth." Collins, however, hopes to make it work yet.

October 15th, Wednesday. — Already we are beginning to experience the moisture between decks common to Arctic ships. Although I was careful to have the cabin lined in England with felt, and the poop deck covered at Mare Island with three thicknesses of canvas, the upper thickness painted, my room shows beads of condensed vapor on every plank of the ceiling, and I suppose it will soon show in other places. I have shut off the after part of the cabin, and thus reduced the space to be heated. This after part is so cool that passing into it from the cabin is like stepping into a cold bath, but yet it is generally dripping with moisture. The temperature at which the cabin and berth deck are kept is 50°. The ward-room is as yet perfectly dry, and as it is used for sleeping only I have not considered it necessary to light a fire in that stove. The berth deck remains dry and comfortable. Of course there is difficulty about proper ventilation and keeping down the carbonic acid gas, but I am hopeful of being able to make everything as satisfactory as possible. Whenever I see a chance to improve matters, I do so. The deck-house is finished excepting the felt lining.

I have grave fears about being able to use the deck-house as a living and sleeping place for the crew this winter. I am afraid it will be too damp, and, considering the amount of fuel I can spare, too cold. We have stoves enough, of course, and fuel enough to keep the ship warm all winter, but my great object is to save fuel, so as to have some to steam a little with next summer, and enough to keep life in us next winter. Accordingly, supposing that the electric light would be a success (which I have no hope of now), I arranged for burning seal and walrus blubber as fuel in the Baxter engine, hoping to get heat from the boiler thereof to warm the deck-house at the same time light was supplied. As Edison's generator failed to give electric light, so did the boiler fail to give heat, to any extent. Clothes washed and hung up in the deck-house were as wet as ever, despite the sheet-iron jacket which ought to have radiated heat. The deck-house acted as a capital condenser for escaping steam. Failing the electric light, I must give up heat also from this elaborate machine, put up two stoves in the house, and fit drip pans so that blubber can be burned in them. We of the human race eat the seal meat, and the dogs eat the walrus meat, and the blubber is burned. Consequently, there is no waste.

To insure a proper changing of air on the berth deck I issue an order to-day to clear it daily from 1.30 to 4.30 P. M., and open all hatches and doors leading to it. To occupy the men profitably during that time, the watch below is armed with Snyder rifles and turned out to hunt for seal and walrus.

October 17th, Friday. — Collins' birthday. Bear caught in trap, but escaped, leaving a lock of his hair as a souvenir. Nindemann got a seal, and Aneguin added another to our larder. We have now seven seals hang-

ing in the rigging, which will in turn serve for as many dinners, while their own blubber may serve to cook them.

October 18th, Saturday. — To our surprise, the cook, Ah Sam, came to-day and asked for a gun to "go shoot a seal." He was furnished with a Snyder rifle and ammunition, and he started off quite gayly. In about an hour he returned, the most astonished and startled Chinaman out of China. At his first shot the gun had burst, tearing up the barrel, fortunately near the muzzle, so that he received no harm; but his mental demoralization was complete. The probability is he let the muzzle slip in the snow at some time, and the end of the bore got choked; hence the bursting.

October 20th, Monday. — Highest temperature, 16°; lowest, 3½°, — the lowest recorded thus far.

October 21st, Tuesday. — The thermometer commenced at 4½°, and at noon had fallen to zero for the first time this cruise. It continued to drop, however, at eight P. M. standing at minus 10½° (light W. wind), whence it commenced to rise, ending the day at minus 4°. For the first time since the 10th, we have clear and pleasant weather with bright sunshine. Our days have become painfully shorter, the sun setting to-day at 3.45 P. M. Our views of him have been so rare that we missed him greatly, and even when he does come now his stay is short. Between noon and three P. M. we had a pleasant treat, thanks to the clear atmosphere and the sun's low altitude. We distinctly saw land again, and unlike any we had seen before. From the deck it appeared like three islands, but on going aloft we were able to discover connecting land. The whole may be one large island with three peaks. The highest and clearest defined peak bore S. 28° W. (true), and may

be from sixty to one hundred miles distant. By 4.30 the atmospheric refraction was very considerable, and it lifted into view a high mountain, saddle peaked, and bearing S. 24° W. (true). Along the horizon was a layer of clouds 1° in elevation, above which the saddle peaks showed clearly.

At seven P. M., with the thermometer at eleven degrees below, our liquid steering compasses froze, and we removed them to the cabin, placing a boat compass in the deck house to keep a record by. The effect of this cold snap is to close up water spaces like magic. While out with the dogs this afternoon where had been open water, I could almost see it freeze harder and harder. Temperature, minus 8°.

October 22d, Wednesday. — Chipp and myself are beginning to experience the effect of cold in our rooms, everything kept hanging against the ship's side and forward bulkhead freezing fast to them.

October 23d, Thursday. — From 8.30 to 9.30 P. M. had our first experience of paraselene, — three mock moons at right angles to the real moon (owing to the moon's low altitude the fourth or lower mock could not be seen). Around the real moon was also a hazy arch.

October 24th, Friday. — To save the men's hands while hauling in the lead-line, we rigged to-day two standards alongside the fire-hole to support a reel, and fitted the reel with two wooden handles.

October 25th, Saturday. — To-day served out fur clothing to the crew, and got on deck two stoves ready for putting in deck house. Our steward, Charles Tong Sing, is sick since last evening with nausea. I hope and think it is a slight indisposition merely. He is invaluable, and does more work than would tire two men.

While he is sick his work is assumed cheerfully by Ah Sam, the cook, another invaluable man, and he performs the duties of both officers' steward and ship's cook with the same benign smile that used to rest on the countenance of our discharged friend Ah See, who described his next of kin as Ah Mo, Canton, China.

October 26th, Sunday. — At ten A. M. held the usual Sunday inspection. I was pleased to find the berth deck perfectly dry and warm. The condensation which formed on the after berths amidships, and in the two rooms opening off the berth deck, has been checked by felting, and I sincerely hope that we shall be able to keep the deck dry and habitable all winter. The forehatch opening into the deck-house has been entirely uncovered, and as a consequence all air entering the berth deck is warmed to some extent before reaching its destination. By my own observation and test there was last night a difference of 20° in the air outside and inside the deck-house (minus 10°, and plus 10°), and this without any fire there. All the air that ventilates the berth deck passes through the deck-house, down the forehatch, and through the sixteen one inch and a quarter holes in each door. This air is again heated by the stove until it reaches 50°, and it then passes off through the skylight, which is kept open, and so far acts as a perfect uptake. The cabin is generally kept at 50°, and the ward-room keeps without fire in the neighborhood of 32°. The temperature of the engine-room is 14°, and there is a small amount of frost on the iron. But as all our boiler pipes and tubes are dried out and the engines painted, no deterioration can occur. Highest temperature, minus 10°; lowest, minus 17°. Weather clear and pleasant, and the low temperature is not cared for in contemplating a bright day. A movement has, how-

ever, taken place in the ice, but whether it is owing to a reduction of temperature or a reduction of pressure I cannot say. About five hundred yards ahead of the ship is a crack in the field a foot wide, and extending in a circular direction for half a mile, and five hundred yards ahead of that a crack six feet wide, and extending the same distance or more. In both cases the rent is a neat one; the water coming up within a foot and a half of the surface, but rapidly freezing in this temperature. Our hunters were out immediately in quest of walrus and seal, but beyond seeing, as they say, one walrus and a bear, accomplished nothing.

Held divine service at 10.30 A. M. I am glad to say that the steward's illness has proved nothing but a mild attack of nausea, and has yielded so readily to treatment that he is now around all right again.

October 27th, Monday. — Added two seals to our larder. In order to have sleds and provisions ready for an emergency calling for a hasty abandonment of the ship, I issued an order to-day to put five sleds in perfect traveling order; also an order in relation to winter routine, and but two cooked meals each day. The amount of coal consumed in the galley is too great to be kept up, when we consider the additional expenditure required in the deck-house, observatory, and perhaps ward-room, and the necessity for our steaming at least a little during next spring and summer. To observe carefully the effect of the winter on us, I also issued an order to the surgeon in reference to monthly examinations of officers and men. Discontinue after this date the taking of sea temperatures and water densities.

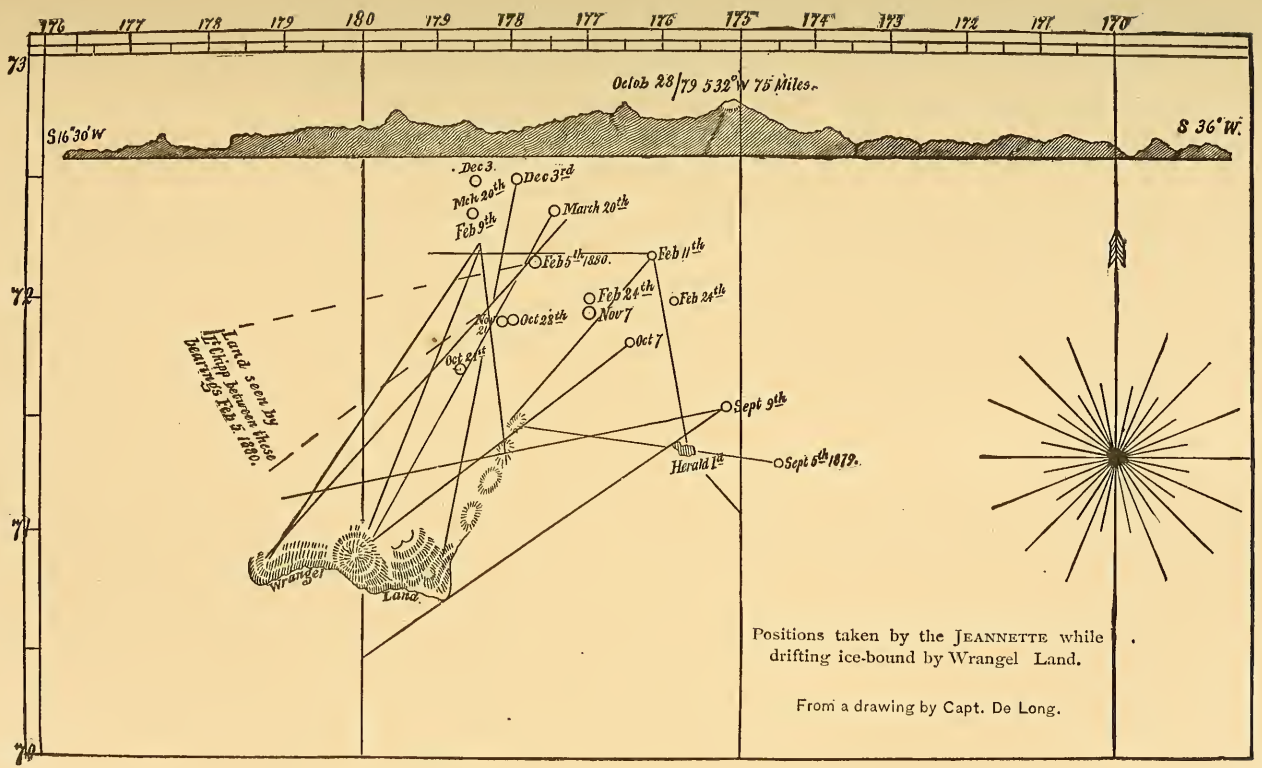
October 28th, Tuesday. — Thanks to a clear sky, this morning at four o'clock Mr. Danenhower got excellent

sights for our position, which he determines to be latitude 71° 57′ N., longitude 177° 51′ W., showing a general drift of twenty miles N. E. (true) from our position of the 21st. At the same time the magnetic variation was determined 23° E. The sun rose at nine, and immediately thereafter high land was sighted to the S. S. W. (true), the extremes bearing respectively S. 16° 30′ W., and S. 36° W., — the highest peak bearing S. 32° W. The whole land seems to be about fifty miles distant. I believe this to be the north side of the land seen by Captain Long in 1867 (Wrangel Land), but I no longer believe it to be a continent. It is either one large island or an archipelago.

At four P. M. Mr. Dunbar, who had been away with Alexey, came back with the pleasing information that they had shot three walruses. Anxious to get this important addition to our dog food, Melville, the doctor, and myself started off with Sharvell and a dingy on a sled drawn by a heavy team of dogs to secure it. After a heavy drag over what Dunbar was pleased to call a mile (but which I think was nearer three) we reached the water, only to find that our three walruses had got lost among the young ice.

In accordance with the various orders issued yesterday, the winter routine, beginning on November 1st, will be as follows: —

6 A. M.	Call executive officer.
7	Call ship's cook.
8.30	Call all hands.
9	Breakfast by watches.
10	Turn to, clear fire-hole of ice, fill barrels with snow, clean up decks.
11	Clear forecastle. All hands take exercise on the ice.



Positions taken by the JEANNETTE while drifting ice-bound by Wrangel Land.

From a drawing by Capt. De Long.

11.30	Inspection by executive officer.
12 M.	Get soundings.
1 P. M.	One watch may go below.
2	Fill barrels with snow. Clear fire-hole of ice.
3	Dinner by watches.
4	Galley fires out. Carpenter and boatswain report departments to executive officer.
7.30	Supper by watches.
10	Pipe down. Noise and smoking to cease in forecastle, and all lights to be put out, except one burner of bulkhead lantern. Man on watch report to the executive.

During the night the anchor watch will examine the fires and lights every half hour, and see that there is no danger from fire. All buckets will be kept on the starboard side of the quarter deck, ready for use in case of fire.

I think the night one of the most beautiful I have ever seen. The heavens were cloudless, the moon very nearly full and shining brightly, and every star twinkling; the air perfectly calm, and not a sound to break the spell. The ship and her surroundings made a perfect picture. Standing out in bold relief against the blue sky, every rope and spar with a thick coat of snow and frost; she was simply a beautiful spectacle. The long lines of wire reaching to the tripod and observatory, round frosted lumps here and there where a dog lay asleep, sleds standing on end against the steam-cutter to make a foreground for the ship, surrounded with a bank (rail high) of snow and ice, and in every direction as far as eye could reach a confused, irregular ice-field, would have made a picture seldom seen.

October 29th, Wednesday. — Weather clear and pleasant, and a perfectly splendid evening. Full moon, bright starlight, and, as the day ended, not a cloud. Land seen to-day in greater extent than yesterday, and beyond the then bearings. Mr. Dunbar and Alexey started out early this morning to endeavor to find the missing walruses of yesterday. They took with them a team of dogs. On the way one of the dogs (Dandy, or Bingo) got out of his harness and escaped, much to the disgust of the other dogs, who attempted to chase him. Alexey in his peculiar language remarked, "Bom bye, other dogs him plenty whip" (for his desertion). After having failed to secure the walruses, the party returned to the ship. About a half hour after the return, the quartermaster came to me and reported that Bingo had been killed in a fight. Alexey's prediction came true. Though three or four hours had elapsed, the dogs remembered the circumstance of the desertion, and finding Bingo at a safe distance from the ship had pitched into him and chewed him so badly before Erickson could reach them that he died within ten minutes of being carried on board ship, — the first death in our brute associates. We skinned him to have his coat for future wearing apparel, and his carcass lies frozen on the deck-house roof for possible food for his murderers.

October 30th, Thursday. — The doctor relates a curious dream he had last night. He seemed to be accompanying the survivors of Sir John Franklin's last expedition on their journey to the Great Fish River, when suddenly he changed his base to this ship's cabin, and began explaining to Sir John Franklin there present some of our articles of outfit, such as Edison's electric machine, the anemometer, and the telephone. Frank-

lin, after listening to the explanations and viewing the articles, tersely remarked, "Your electric machine is not worth a damn, and your anemometer is just the same." The telephone he seemed to consider a good thing.

The electric machine, after having received Melville's attention, had been in hand for some days unreeling and reinsulating, and reeling again the wires, and was now ready for another trial. Steam was accordingly raised in the Baxter boiler, and the generator connected; but though seventy pounds steam was applied, not a spark even could be obtained, nor a deflection in the galvanometer needle. The only effect was to fill the deck-house with the fearful smoke of burning blubber, and to make it dripping wet from condensing steam and the shower of rain falling from the roof. I concluded that time enough had been lost in trying to make this machine of use, and I would no longer keep the finishing of the deck-house in abeyance, and hence I ordered the engine struck below into the old galley-room, and cleaned and painted for laying by. Our telegraph wires are broken in several places this morning from their own weight, increased by a slight amount of frost. We have tried laying them in the snow, but it has rotted them through and through. Bare copper wire No. 24 is evidently not the thing. When we get our first heavy fall of snow I shall try running them again, but I begin to fear that Franklin is right in both his statements. The hunters brought in three seals to-day as a pleasant thing to contemplate after being disgusted with electric experiments, and at supper to-night we had a new dish offered us, — walrus sausage, — and a rare good thing it is. Bear, seal, and walrus are not to be despised, and I agree with Chipp,

who says that heretofore, when he read that men were subsisting on bear and seal, he believed they were having a hard time, but he will know better in the future.

October 31*st, Friday.* — The open water streaks are again closing up, the ice piling up to a height of some ten feet as the floes come together. Chipp has observed that these openings occur at full and change of the moon, and disappear at the time of neap tides. There may be a tidal action here, but as we are drifting around with the floe there is no chance for tidal observations. The weather has been so thick the last two days that we have seen nothing of the land. If we could only drift in near enough to it to land on it and explore it I should feel that we had accomplished something to keep us in countenance. It is hard that our first season should thus be passed in idleness.

November 1*st, Saturday.* — Began to-day the winter routine.

November 2*d, Sunday.* — Inspected the ship at eleven A. M. while all hands were on the ice for exercise. Having kept up roaring fires of blubber in the two stoves in the deck-house since yesterday morning, I was pleased to find that all the wet clothing had thoroughly dried, and that the deck-house was dry and comfortable; in fact, the temperature ranged between 60° and 70° at the forward end, the stoves being in the middle. At one P. M. mustered the crew and read the Articles of War. At the conclusion of this ceremony held divine service.

November 3*d, Monday.* — Discovered this morning a crack in the ice two hundred yards N. W. of the ship. It ran in an irregular direction for about one quarter of a mile, and was in places nearly twenty feet in width. The surface of the sides of the opening was but two

feet above the surface of the water, which had of course become ice. This is bringing these cracks too near home to be pleasant, and I sincerely hope no nearer openings will cause us to be uneasy in our now comfortable berth, where we seem as steady as in a dry-dock. A faint trembling of the ship in high wind, such as is now blowing (at midnight), is the only unsteadiness which we have. The doctor, in obedience to my order, commenced to-day the (to be) monthly examinations of officers and men, beginning with myself.

November 4th, Tuesday. — Carbonic acid test, taken at eleven last night on the berth deck, gave 2.3430 volumes per thousand, or 0.23430 per cent. This is the worst we have yet obtained. Medical examination continued and concluded. Until I get the surgeon's detailed report I cannot record results. In my own case, the only change I remark is a falling off in weight. My weight on sailing from San Francisco was one hundred and ninety-five pounds, now it is but one hundred and eighty pounds.

November 6th, Thursday. — A day of extraordinary interest and some anxiety. At nine A. M. we were disagreeably surprised at finding a large crack in the ice on the starboard quarter about two hundred yards distant, a small crack under and right across the stern, and a small crack leading from the stern for a hundred yards ahead. Although I could not account for them, I saw no reason to be uneasy, for we have had no high winds this month, and no pressure had occurred in our vicinity. At four P. M., however, Collins, who had gone on the usual hourly visit to the observatory and anemometer, came running back announcing that an opening had occurred in the ice between the observatory and tripod. We all hurried out and found a large rent, al-

ready four feet wide and widening, extending parallel with the ship's length to her starboard quarter, and thence across her stern, averaging one hundred yards in distance. We promptly removed the instruments (anemometer, thermometers, rain-gauge, barometer, and dip-circle, etc.) to the ship, setting them up there. The opening kept on widening, new ice forming immediately on the surface, and by midnight it was some twenty yards in width. Some premonitory crashes and groans of the ice added to my anxiety lest some fissures should occur in our floe and make our position serious. But we did not move an inch, either in our angle of heel (4°) or in azimuth, and at midnight we have nothing worse to contemplate than an opening one hundred yards off.

Dr. Ambler handed me to-day his report of the medical examination. He considers the examination as very satisfactory. Of the thirty-three persons on board, the general condition of twenty-three is pronounced "excellent," of eight "good" (I am among this party). To my surprise, however, seven say they do not get enough to eat, or sometimes do not get enough; of these seven, four are in the cabin mess. Of these four, two have enough in quantity, but as some things are not cooked in a shape to their liking they do not eat the full ration. The remaining two have neither sufficient in quantity, nor liking for some articles served.

I give the bills of fare and weights of articles of food (see Appendix D), and I believe that both in quantity and variety it is superior to any previous Arctic experience. The surgeon expresses his opinion that it is all that is necessary in both respects. However, rather than any one should consider himself as underfed I shall probably increase the rations. If we could only get a clear day we should probably find our-

selves much nearer to land than we have been heretofore.

November 7th, Friday. — During the night the opening closed under seeming great pressure, for at daybreak, say eight A. M., the ice was piled up in great heaps on the edge of our floe, which was of sufficient strength evidently to bear the brunt. The pressure came from S. S. E., the line of the crack being N. N. E. and S. S. W. true, and since our floe was the stronger, the pressing floe rode up on top of it, breaking off, and leaving its own edges in a muddled pile. The thickness of these edges was by actual measurement 7 feet 10 inches, 6 inches being snow on the surface. Some of the pieces were pea green, or sea green rather, and some light blue, and in several places showed a muddy and dirty side as if they had been in the mud or had stranded on a beach.

Not knowing very well what was going to happen, I watched this ridge with considerable interest. We had had since midnight a decreasing S. W. wind, but at ten A. M. it became perfectly calm. About eleven A. M., to our surprise, the pressing floe receded, leaving a space about ten yards in width from floe to floe, and through this the ice began to set to W. and N. as through a gorge, with a velocity of about half a mile an hour. The pressure became very great. The smaller pieces passed on readily enough, but the large hummocks or broken floe pieces would occasionally jam against our floe, and being pressed from behind by the confused mass would exert an influence on our floe that made it groan and crack and move under our feet. This mass was flowing not over fifty yards from the ship, then heading east northeast, and as it crushed and groaned along, and our floe throbbed and shook with the strain brought upon

it, I almost momentarily expected to see the ice split in all directions around the ship, and the ship herself be carried along with the tumbling heap. Nothing of the kind happened, however, thank God, and about four P. M. the motion ceased. The ship had not moved an inch. Five sledges stood packed on the poop, with forty days' provisions for men and dogs, but these might have availed but little. In fact, I doubt if they would have stood the racket of being dragged over rough ice with their weights. Suspending, therefore, other work, we commenced the construction of two strong sleds to carry our dingys.

Our floe must have moved; for to-day we are in twenty-three fathoms. The openings in the ice exposed so much water to the action of the cold air that we have had all day a thick fog, highest temperature plus 3°, lowest minus 10°.

November 8th, Saturday. — A quiet day and a relief to the anxiety of yesterday. Still I cannot help feeling more or less uneasy. The line of broken ice is so near us that I fear we may have some trouble at the next gale of wind. All the commotion of yesterday occurred with calms or light airs. Had it been at regular periods, it might have been considered due to tidal action; but as it occurred only once in the twenty-four hours that idea must be abandoned. Some resisting field of ice has given way, and the rush was the result. If we consider that rush accelerated by a gale of wind, it is not difficult to realize the peril of a ship carried along by it. Drifting with it might not be so bad, but the hanging of the ship on an impediment while this surging and grinding mass was pushing against and perhaps over her would at least not improve the situation. My fear is, therefore, that if we have a gale of wind be-

fore all these broken floes can become cemented together, the whole mass will get in motion again and our floe may split up, set us adrift, and plenty of trouble be ahead of us. However, we must wait and see. Human foresight is of but little avail. Aid from above is all that can prevail, when a ship is drifting in an ice-floe.

Sighted high land between S. and S. S. W. for a few moments about eleven A. M., but too indistinctly to recognize it as anything we have seen before.

November 10th, Monday. — A large water hole to the E. S. E. giving off vapor upon coming in contact with colder air. Sounded at noon in 17 1-2 fathoms. At noon sighted again the land seen on October 29th and on the same bearing. At three P. M. grinding and pressure began again, our floe this time cracking and breaking up to within one hundred feet of our starboard beam and quarter. From eight P. M. to midnight a fine auroral display, beginning with swirling tails from N. to E., and ending with radiating bands extending from a central point at N. to N. E. and N. W.

November 11th, Tuesday. — A day of great anxiety. At 6.10 A. M. I was awakened by the trembling and creaking of the ship, and almost immediately the man on watch came in my room to inform me that the ice was again in motion. Hastily tumbling out and dressing I went out on the ice. The grinding and crushing flow of ice to the westward had again commenced, and the jamming of large pieces from time to time, splintering our floe, caused breaks and upheavals to within about seventy-five feet of the ship. The ship groaned and creaked at every pressure until I thought the next would break her adrift. The pressure was tremendous, and the noise was not calculated to calm one's mind. I know of no sound on shore that can be compared to

it. A rumble, a shriek, a groan, and a crash of a falling house all combined might serve to convey an idea of the noise with which this motion of ice-floes is accompanied. Great masses, from fifteen to twenty-five feet in height when up-ended, are sliding along at various angles of elevation and jam, and between and among them are large and confused masses of débris, like a marble yard adrift. Occasionally, a stoppage occurs; some piece has caught against or under our floe; then occurs a groaning and cracking; our floe bends and humps up in places like domes. Crash! the dome splits, another yard of floe edge breaks off, the pressure is relieved, and on goes again the flowing mass of rumbles, shrieks, groans, etc., for another spell.

Our performance lasted only for half an hour this time. At its conclusion I was startled to find that a break had occurred in the floe across the bows of the ship running towards the southwest, and that a projecting floeberg was plowing its way like a wedge to break up the floe ahead of us and make a junction with the old stream. In this case we should be in the centre of an island, small at that, whose edges would be worn away on all sides until we were left alone to be hurried along in the race. At 4.20 P. M. the excitement began again, and this time we had it heavily for four hours. I fully made up my mind that we must go adrift. Hurriedly we broke up our temporary observatory near the ship and took the instruments on board, suspending our meteorological record while graver matters required our attention. Everything movable was brought in, and finally the dogs were with great difficulty collected and brought on board ship, a proceeding which they did not like, and which they resented by jumping over the rail on the ice again, until we boarded it up so high they

could not clear it, and then they relieved their minds by fights among themselves.

This movement of the ice begins to make me believe it is a tidal action of some kind, although it flows in but one way — to the westward. Fearing another rush during the night, I ordered everybody to hold himself in readiness for immediate action, sleeping myself with my clothes on and knapsack handy in case of accident. As is usual nearly every day we had light, drifting snow.

November 12th, Wednesday. — At 4.15 A. M. Mr. Newcomb, who sat up until this hour, roused me with the information that the ice was again in motion. Rushed out on deck and found that we were in for a lively time. The pressure was greater than ever before in our experience. To the ice rushing and growling alongside of us I did not pay much attention, for though our floe humped badly, and cracked and split in all directions, there was not much obstruction to the flow of ice. But the break in the floe across the bows gave me serious concern, for I saw the piled-up ice advancing toward us seemingly as fast as a man could walk. Abandoning the line of union which it yesterday tried to make diagonally across the bow to the flowing stream on the port quarter, it bore down directly upon us. At each grind of the advancing mass it piled up floebergs in front of it, and the ship shook and trembled like a reed. From my post on top of the deck-house the view was magnificent though awful. I fully expected we should be swept away into the grinding stream, and as the approaching ice made one more startling advance than usual, I grasped the mainstay to keep my place when the final crash should come. All hands had been called and stood ready, although there was really nothing to

be done. When at 6.25 the advancing wall was twenty-five feet from the stem, the pressure suddenly ceased, and everything was quiet again. At seven the first signs of dawn made their appearance, and as the increasing daylight made objects evident to our eyes, it was a startling spectacle to see the confused wreck that had been made of our once smooth floe. The dogs, which had been carefully brought on board at the first warning, were now liberated again to the ice, where they flew around with all the gayety of children let out of school.

At nine A. M. land was seen on the bearings of October 29th, and recognized as our so-called north side of Wrangel Land. I was exceedingly anxious all day, for I counted upon the usual afternoon tidal pressure, which I fully expected would finish the work begun and almost completed this morning. But to my great surprise not a movement occurred, and I again kept my clothes on all night ready for a startling call. Highest temperature minus 11°; lowest minus 24°. Sounded at noon in eighteen fathoms (blue mud).

November 13th, Thursday. — Aroused at two A. M. by a loud crack under the ship. Collins, who ran out to examine, reported that he saw no signs of trouble, except a number of small cracks across the bow, and the fact that the rent leading out from the stem had opened to an inch in width. I concluded this would prove a forerunner to a morning's excitement, but again I was pleasantly disappointed. Not a thing disturbed us for the remainder of the night, and the day wore on, afternoon came, and still no trouble. The meteorological instruments were put out on a temporary observatory hill near the ship, and I began to hope that we might have a few days' peace. At eleven P. M. I went out to record the

temperatures and anemometer, and stood on the hill a few moments regarding a beautiful auroral arch extending from E. by S. to W. by N., the crown being 70° in elevation and bearing north. Hearing a few little crackles, like a dog walking over snow, I looked around to see which dog had followed me, when I descried two men running over the gangway and racing for the stem. I ran there at once, and to my amazement saw the ice float away to the northward along our whole length, leaving nothing but water on our port side. In twenty minutes we had one hundred and fifty feet width water on our port side, — the split occurring in as neat a line with the keel as if the keel had cut it, the ship remaining fast to the floe along her starboard side, not even a crack being made in her snow wall. The whole port side, snow wall intact, just slid away without noise or excitement. Four of our dogs which lay asleep on the floe were not awakened by the movement until the ice was nearly one hundred feet away, and then they could not get back, our hands being too full in getting our things aboard to send for them.

The meteorological instruments were once more hurriedly gotten on board; the dogs, except Tom and his three companions, collected and penned on the quarter deck; both dingys got up on the roof of the deck-house, the steam-cutter dug out of the ice and placed on the roof likewise, the tripods taken in, all boats cleared away ready for lowering, the port after clew of the quarter deck awning triced up ready for passing out provisions, etc.; and by midnight nothing belonging to the ship remained outside of her.

S. W. winds until eleven P. M., when calm. Barometer rises from 29.74 to 29.82. Highest temperature

minus 10°, lowest temperature minus 15°; sounded at noon in twenty fathoms, blue mud.

Kept everybody in his clothes ready for a call, piping down after serving out hot coffee forward and hot tea aft.

November 14th, Friday. — Nothing occurred to disturb us during the night, although of course anxiety as to what might occur at any moment did not allow us to get much sleep. I sincerely pray that we are not going to have the experience of the Tegetthof in her long and perilous drift in the pack. This steady strain on one's mind is fearful. Seemingly we are not secure for a moment, and yet we can take no measures for our security. A crisis may occur at any moment, and we can do nothing but be thankful in the morning that it has not come during the night, and at night that it has not come since the morning. Living over a powder-mill waiting for an explosion would be a similar mode of existence. Our nights are beginning to be very long. To-day the sun rose at 10.30 A. M. and set about 1.30 P. M. Twilight on clear days begins about seven A. M. and ends at five P. M., giving us fourteen hours black night. Before many days the sun will leave us altogether, and we shall have a long spell of waiting for his reappearance. Daylight this morning showed us that our port floe with its snow wall was five hundred yards to the northward. It first moved to the eastward, then to the westward, and finally came to a stand opposite its proper place alongside the ship, and five hundred yards distant. Ice formed four inches in thickness in the fire-hole during the night. As the sun came up we again saw our "north side of Wrangel Land," between S. 40° W. and S. 6° W. bearings. And we again sighted our old friend Herald Island, bearing S. 49° E., all bearings true.

November 15*th, Saturday.* — A day of complete quiet as far as ice is concerned. The open water on our port side has frozen over sufficiently to bear walking upon it. Alexey was accordingly sent to the opposite side for Tom and his friends, and he brought the three (not four) missing dogs back, to my great satisfaction, and no doubt to theirs also, for they seemed glad to return to the land of dried fish. Not that they had hungered during the separation, for Alexey says he saw a lot of bones where they were, which these dogs had no doubt saved in times of plenty and buried in the snow for future emergencies. The remaining dogs were very indignant at the absent but returning ones, and had they not been prevented would have given them a fight as a celebration, looking no doubt on the enforced separation as some new dodge for shirking work. Finished to-day making sleeping bags for all hands.

November 16*th, Sunday.* — At eleven A. M. held my usual inspection. Found everything dry and comfortable below. At one P. M. held divine service. The S. E. wind which sprang up yesterday blew with great force during the night with terrific squalls; and though its velocity for a whole hour was no greater than seventeen miles, at times it must have been at the rate of fifty miles. It continued blowing during the day, and I stood by from midnight for some exciting result. We are seemingly resting in a cradle made under the ship in the neighborhood of the foremast, and which has not been sufficiently disturbed by our port floe leaving us to set us adrift; for although the heavy wind has been blowing on our starboard bow (its best hold for shoving us off), we hang on bravely. Should large masses of ice come grinding along our port side, it will be a ques-

tion of endurance as to our retaining our present place. The view to port therefore receives our greatest consideration.

At 2.30 P. M. the young ice alongside of us commences to split, and immediately the floebergs commence to make down on us. Jumping on the deck-house I view the procession with some anxiety. By great good fortune a projecting piece of our starboard floe holds on and fends off the floating pieces, and this push, aided by the wind, carries all dangerous masses just clear of our port side. Just astern of us there happens to be a bight in the floe, into which the drifting ice goes quietly and comfortably, and the open spaces being soon filled up the movement ceases about three.

To-day the sun left us, although for all the good he did he might have left yesterday. The weather was so cloudy that we had nothing more than daylight. In seventy-one days we will be looking for his reappearance.

November 17th, Monday. — Ice quiet during the day.

November 18th, Tuesday. — At six A. M., with a light northern wind, the ice got under way again and jammed along to the N. W. The pressure across the bows was very great, and this time the grinding mass fairly reached the stem. I surely expected the ship to be carried along with it, but a heavy beam pressure held us up against our floe, and the barricade was switched off at an angle. The pressure lasted until noon, the ship creaking considerably, rising a little, and heeling over 4¾° to starboard.

November 19th, Wednesday. — From six A. M. to noon heavy ice pressure on port quarter and beam, increasing our heel to 5°. From six to seven P. M. heavy beam pressure.

November 20th, Thursday. — Beyond occasional slight

pressure, which increased our heel to starboard to 6°, we have a day of no uneasiness. That is to say, we are not momentarily expecting to be turned away from our floe and sent grinding along with a stream of drifting floe lumps, or looking for a breaking in of our side by immense pressure. But as I cannot help realizing that we are in an exposed and dangerous position, and that either of the foregoing catastrophes may occur at any moment, I cannot be said to enjoy quiet or peace of mind. Sleeping with all my clothes on, and starting up anxiously at every snap or crack in the ice outside or the ship's frame inside, most effectually prevents my getting a proper kind or amount of rest, and yet I do not see anything else in store for me for some time to come. This pack is likely to have some motion all winter I suppose. So long as there may be water down by Behring Strait there will be space for relieving the pressure. But when the outlets close up and pressure continues, whether by wind or tidal action, the humping and piling up will go on around us and keep us in a constant state of turmoil for months to come. Truly this is no pleasant predicament. Wintering in the pack may be a thrilling thing to read about alongside a warm fire in a comfortable home, but the actual thing is sufficient to make any man prematurely old. Since we have become surrounded by ice again, and could hardly move very far or very fast, I have allowed the dogs to remain on the floe again to our mutual satisfaction. Though a few luxurious ones prefer seeking the shelter of the ship, the majority prefer living in the open air; hence our attempt to bring them on board only resulted in a series of fights and violent attempts to break away again. Once on board it would take four men to keep one dog from breaking for the ice, and there have been

frequent escapes. The other night one of the stragglers was taken by Collins to be a bear. A rifle was hurried for, but the "bear" had left fortunately, else we might have had a dead dog on our hands. Last night one of them fearing an imprisonment must have sought shelter on the ice lumps on the port side. At all events he was there this evening; and the ice having moved off a few feet from us, leaving a water hole, he could not come back the way he went, and would not come by any other in spite of our coaxing. While walking on the ice alongside I heard a subdued "yelp" under the bow, and rushing there I was just in time to plunge my hand in the water, and save our canine friend from going under for good. He was pretty far gone and remained in a dazed condition for an hour or two after I hauled him out.

November 21*st*, *Friday*. — Slight pressure in the forenoon, after which the ice recedes, leaving a line of open water on our port side. Sight the land again on its accustomed bearings. Bright moonlight and starlight. At twelve midnight a bright halo around the moon about 2° in diameter, and showing prismatic colors, the crimson on the outer edge predominating. The low temperature fills the air with frost dust, through which the moon's rays are prismatically seen. Position at seven P. M. shows a drift since November 17th of twenty-two miles W. 4° S.

November 22*d*, *Saturday*. — The day begins with a calm, but at three A. M. a N. E. wind sets in, and blows until midnight with varying velocity, the maximum being thirteen miles. The barometer falls alarmingly fast from 29.72 to 28.88, and the temperature rapidly runs up from minus 17° to plus 10°. The wind blows in heavy squalls at times, but I see no indication

of very bad weather until perhaps when the barometer begins to rise again. Sounded at noon in twenty-three fathoms, and the lead line indicated a drift to the westward. We experience a slight pressure under stern from floes which have advanced from the southward to cover up the vast expanse of open water which has been on our port beam.

Alexey and Nindemann while out this afternoon fell in with a bear and her cub. Alexey shot and killed the bear, and had a lively tussle with the cub, in which he got his clothes torn. The ice was so uncertain, and it was so late, three P. M., when Nindemann got to the ship to report the shooting, that I did not run the risk of trying to get the dead bear to-night, and accordingly sent the metallic dingy to bring Alexey back, leaving the game until to-morrow. "Plenty jump," says Alexey.

November 23d, Sunday. — The day begins with N. E. winds, which change to S. E. and back to N. E. with a velocity varying from three to thirteen miles an hour, during which the barometer steadily falls to 28.79, and the temperature rises to plus 24°, making it uncomfortably warm while exercising. At nine P. M., after a short calm, the wind comes out suddenly from the S. W. with a velocity which almost immediately amounts to twenty miles an hour, and causes the temperature to fall quickly to plus 5°. The weather, which before the shift had been overcast and hazy, clears so that at midnight we have the benefit of moonlight and starlight.

A few pressures during the day are the only things which disturb us. At one P. M. the advancing floes pile up the ice under the bows, and I have no doubt that this will serve as an entering wedge which, aided by the wind on our starboard beam, will, before this

southwester is over, break us out of the bed where we have so snugly lain for over two and a half months. Nindemann and Alexey started off in pursuit of the bear shot yesterday. But owing to the opening of the ice in the mean time they were unable to reach the place of the conflict.

Inspected the ship at eleven A. M., and held divine service at 1.30 P. M.

November 24th, Monday. — It has come at last; we are broken adrift from our floe! Suspecting what the continued action of this S. W. wind would be, I made sure to have all the dogs securely housed on board ship before I went to bed last night, *i. e.*, before I lay down in my clothes to get some sleep. At five P. M. I was aroused by a preliminary pressure under the bow. Turning out I reached the deck-house top in time to see a very severe nip which started our port bulwark planking, the ice being already piled higher than our port rail in some places. The ice under the bow was piled up as high as our figure-head, and the pressure in this direction was increasing. A floe piece with a wedge shape had pierced "our" floe, and was exerting its force bravely. The ship creaked and groaned. Something had to give, for the pressure from ahead and abeam was very great. Suddenly the ship lifted by the stern, the wedge advanced, and our floe was split, and the port pressure decreasing we were afloat on an even keel once more. The port floe moved slowly to the N. E., and we followed it, our snug cradle of two and a half months being split and shattered, and no longer our refuge and our strength. All our effects being long since removed we had nothing to bring in but our gangplank, which was soon accomplished. Throughout the day we remained nearly in the same place, resting at

one time against one floe, and at other times against another.

The S. W. wind blew with a velocity between twenty and twenty-six miles an hour, changing occasionally to W. S. W.; towards midnight it moderated to fifteen miles an hour. The barometer steadily rose from 28.95 to 29.63. The highest temperature was plus 2.5°; the lowest minus 5°. The air was filled with falling and drifting snow all day. Sounded at noon in twenty-two fathoms, and observed our drift to be to the northward and eastward.

November 25th, Tuesday. — The S. W. wind piped up again after midnight, and blew with a velocity varying from twelve to twenty miles until eleven A. M., when it went to west, remaining there until midnight, blowing with a velocity varying between twelve, seven, and three miles. The barometer rose rapidly from 29.64 to 30.32, — so rapidly, in fact, that I am suspicious of it, and inclined to look for some more bad weather. Highest temperature minus 3.5°; lowest minus 12°. Bright moonlight and starlight. Sounded at noon eighteen and one half fathoms.

To-day has been one of the most anxious and exciting days we have yet had. At 6.15 a slight pressure on the port bow commenced hostilities. At 9.15 a very heavy squeezing on port side started our bulwark planking, and pinching down under us heeled the ship 3° to port. At ten A. M. the pressure ceased, and we were left floating upright in a small lead of open water, and adrift as far as any floe ice was concerned. For a time I was undecided what to do. There was no floe near us large enough to anchor to securely, and the chance of another pressure coming while the ship was tied up and unable to give to it was too unsatisfactory. If the

ship were free when the ice moved she would go along with it; if she were tied up she might have to stand the brunt in a very unfavorable position. As it was, she lay in a kind of canal a little wider than her own length, and ready for action ahead or astern. I concluded to let her remain so, and watch for results. At five P. M. I noticed that she commenced floating stern first through the canal. About a mile astern (E.) was a large patch of open water, and from ahead (W.) the broken floe pieces were gathering away and coming down upon us. At a little bend in the canal her stern took the floe and held fast, while her bow payed around as prettily as if we were casting under jibs. No sooner had she got stern to the wind than the advancing ice was upon us, and we were pushed, forced, squeezed, driven through this mile of a canal amid a grinding and groaning of timbers and a crashing and tumbling of ice that was fearful to look at. Still we sailed on, and in a half hour or so were sent out into the opening beyond where our speed decreased, and drifting over toward a thin floe we ran our bows into the young ice and held fast heading S. Though we moved at no time with greater speed than say two knots an hour, our passage through that sluiceway of running ice was enough to make one's hair stand on end, and each of us heaved a sigh of relief when it was over. If we had in the morning planted an ice-anchor to a small floe, I am convinced this pressure would have torn us away from it, and the stream of flowing ice might have jammed us across this canal and given us some injury, even if it had not climbed on board. Having a bright moon, nearly full, we could see, and that was a great comfort. I could not help thinking how much worse it would have been on a dark night, when we could have heard

all this trouble and yet have seen nothing. What one can see, he can to some extent prepare for; but it is the unseen danger that strikes the most terror to the heart. A man must be a hard unbeliever who does not recognize a divine hand in these wonderful escapes.

A most beautiful effect was created to-night by the moonlight reflected or refracted from the floes. A pure golden light was thrown around and above the ice, making one believe he was looking into fairyland.

November 26th, Wednesday. — My suspicions at the sudden rise of the barometer yesterday were correct, for to-day we have had and are having a snorter from the S. E. The day opened calm, and so continued until four A. M., when a light S. E. wind came up. This slowly freshened, until at noon it was blowing with a velocity of eight miles an hour, and at one P. M. the gale burst upon us, blowing twenty-one miles the first hour and reaching twenty-nine miles before midnight. The barometer rose to 30.27 until the wind freshened, when it began to fall, reaching 30.28 at midnight. The weather had a hard and angry look, and I see we are in for a screamer. The temperature began at minus 9°, but rose to plus 10° as the day ended.

The ship held fast in the young ice in which she ran last night, but shook from truck to keelson as the heavy gusts took her. A few water holes were in our neighborhood, and the main solid pack could be seen in all directions. This bay will no doubt close as soon as the ice takes up its motion again, which I have observed occurs when there is little or no wind. The heavy winds pack up the large masses, and in the calms and light winds, the pressure being removed, everything struggles to get back again to its old condition, and openings and races occur. Sounded at noon in

twenty-one fathoms (soft bottom). Sighted land on the same general bearings of October 29th.

November 27th, Thursday. — The wind went to S. S. E., and blew all day very hard, its velocity ranging from twenty-five to forty miles an hour. The squalls were very heavy, and though we moved only about half a length astern (to leeward, where we brought up against young ice), the ship shook as if her spars were coming out of her. At midnight the gale continued in full blast. The lead line showed a drift to the N. W. Evidently all the ice is drifting the same way, for the shores of our bay do not seem to contract much, and so I suppose there must be some large water space to the N. W. into which all this ice is drifting. If it brings up anywhere before a N. W. wind can stop its way the pressure down here will be tremendous, and our open bay will shut up like magic, in which case we must prepare for more anxiety.

Since being beset to the present time, though we have had difficulty in getting snow pure enough to make drinking water, we have not been absolutely unable to do so. But now there is so little snow remaining in our neighborhood that we are in a serious position. Very little snow has fallen thus far, and we have subsisted on drifts; and as we are away from drifts now, and cannot reach any, we have been forced to come down to scraping the floes around us. The snow resulting is quite salt, and our tea and coffee to-day are quite unfit to drink. It is not safe in our present condition to send men away any distance, for if the ice breaks up (and fissures are to be seen in all directions) we might go adrift again and have more than we could do perhaps to get the men back. Took the temperature of a small lane of water alongside at midnight and found it 27°.

November 28th, Friday. — Very hard blow from S. E. all day until towards midnight, when it slackened up a bit. At midnight, however, it commenced piping up again at S. E. by E., promising another installment of the gale for to-morrow. Stars of the first magnitude were easily seen to-day at one P. M.

There being no chance of getting snow of proper purity, we got up the Baxter boiler to-day, and, rigging a coil to it, commenced distilling. I am afraid this will be an expensive business in the way of fuel, but it cannot be helped. The snow that we have been able to get for the last two days has been so salty that many of the officers and men are being treated for diarrhœa. This, of course, will never do, and pure water must be obtained at any cost. We are all feeling the lack of exercise very much. The ice is so treacherous that it is unsafe to get on it. The poor dogs also feel the confinement, and when they are not engaged in a cheerful fight go moping around in a desolate way. They have regular cliques, and occupy certain portions of the quarter deck exclusively. Any trespass brings on a fight inevitably.

November 29th, Saturday. — A day of wearing anxiety. The gale continued, varying between E. by S. and S. E. At seven A. M. the ice commenced to move, and seemingly to windward, as if the pressure were forced back on itself. As we lay broadside to the movement we had the full force of it on our frame. The ice on our port side (the weather side) seemed tougher and more unyielding than heretofore, and the whole mass made our ship snap and creak with the squeezing worse than ever before. Several times the pressure became so great that the ship ceased to creak, and the deck seemed ready to burst open. To leeward

of us one large sheet of ice would ride over another large sheet, and the two come down against us; the port floe would decline to yield; the two sheets to leeward would break edges and pile up blocks against our starboard side, and then begin pressing against these; the ship would groan and squirm and then seem dead, while the deck trembled. This might last half an hour, and when it seemed as if wood and iron must give, the port floe would hump up and split, and we would be pushed on for another nip. This sort of thing lasted until three P. M., and then the nip seemed to be hardest of all, and remained so. We could not tell whether it let up or not, for we were jammed tight, heeling $2\frac{1}{2}^{\circ}$ to starboard. The ship could not rise, for the ice was only a foot thick, and took the ship's side above the bends only; it was simply a question of its going through her, or of her being strong enough to stand it. She was strong enough, and that is all we can say. If she had not been strong enough she would have been cut in two. Eight hours of this mental tension is enough for one day.

November 30th, Sunday. — A day of peace and quiet doubly acceptable after the strain of yesterday. The gale blew itself out at six A. M., and we had a bright moonlight and starlight until the struggling daylight came into play at nine. Of course, we do not see the sun at all, and our noon is but the twilight of ordinary latitudes. Occasionally it is beautiful indeed, as, for instance, to-day, when we had a few golden and red streaks in the S., a clear blue sky to about 20° in arc, and the remainder of the heavens dark blue, illuminated by a full moon. Venus was visible at noon. The ice around us made a picture in its lights and shadows. The broken pack surrounded us in all directions, while,

as if in the centre of a frozen lake, the Jeannette lay squeezed by slabs of ice eight and one half inches thick, with humped up and splintered floes, showing where she had proved her strength.

Attempts to be poetical in the Arctic are praiseworthy, but I think I shall give them up. My sensations of being in critical situations are too keen to allow me to write in cold blood about the beauties of ice scenery. I will simply remark that the pack is no place for a ship, and however beautiful it may be from an æsthetic point of view, I wish with all my heart that we were out of it.

We were able to resume our exercise of two hours, which was a great benefit and comfort to us. Sounded at noon in thirty-two fathoms (blue mud), and a drift to the N. and W. was indicated by the lead line. A raven, which flew around the ship, was brought down by a rifle shot by Aneguin, and added to the naturalist's collection. The loom of land was seen to the S. W. At eleven A. M. inspected the ship, and at one P. M. held divine service.

By two lines of position obtained from observation of the moon and Mars, Danenhower determines our position at 7.30 P. M. to be latitude 72° 36′ N., longitude 178° 08′ W., from which it appears that since November 21st, the date of our last observations, we have drifted forty miles to the N. 1° W.

I take leave of the month of November without the slightest regret. It has been a month of gales, ice pressures, and discomforts mental and physical. Earnestly hoping that December will drift us quietly and peaceably nearer the Pole, and bring us to some land where we can at least have the merit of discovery if not of exploration, I say good-by to November, and invoke God's blessing on our ship and ourselves.

CHAPTER VI.

THE DEAD OF WINTER.

December, 1879 — 26 *January*, 1880.

Auroral Displays. — Daily Walks. — Trouble with Water. — The Darkness. — Monotony of Life in the Arctic. — Tests of Light. — Discomfort. — The Shortest Day. — Christmas. — Tidal Action. — The Old Year and the New. — Festivities. — Danenhower's Misfortune. — A Cold Snap. — A Leak. — Serious Business to close it. — The Pumps. — Reappearance of the Sun.

December 1*st*, *Monday*. — The clear and beautiful weather of yesterday continues to-day. The barometer rises from 36.36 to 30.56, an unusual circumstance, and one worthy of attention as to its results. These areas of high and low pressures follow each other like waves, and bring us generally quite as bad weather in the high as in the low. The atmosphere is remarkably clear, and sounds made on the ice, while being transmitted to great distances, seem to reverberate like sounds made under a large dome. The human voice has all the intensity noticed when one speaks in an otherwise empty hall or in a cave. The highest temperature was plus 4°; the lowest minus 5°. A halo was about the moon. A mirage to the southward of an open water space was very clearly defined in the sky.

Sounded at noon in thirty and a half fathoms (blue mud). Ice quiet and ship remaining immovable.

The usual monthly physical examination of officers and men was begun to-day. I shall notice with much

interest the result. I can see no change for the worse from ordinary observation. We have at times been troubled by not getting pure snow for drinking and cooking purposes, and as this may continue until we have a heavy snow-fall (for our distilling is not perfect) I shall commence to-morrow the issue of a ration of one ounce lime juice to every officer and man each day.

December 2d, Tuesday. — A quiet day. We had, in addition to one of the most beautiful moonlight effects on the ice I had ever seen, and a sky perfectly free from clouds, a fine chance to witness auroral and other effects. At ten P. M. a lunar rainbow was visible, showing faintly the prismatic colors. Towards eleven P. M. this was succeeded by a lunar halo in which the prismatic colors were clearly visible. Then flared up an auroral arch, extending from N. to N. E., whose crown was 34° in altitude, and this arch, as if by magic, absorbed the lunar halo, or caused it to disappear. Then suddenly the lunar rainbow reappeared and arched alongside the auroral arch; and finally, at 11.50, the auroral arch became an auroral curtain, floating sheets of trembling flame down to the horizon. Not a sound was heard during all this display. Add to this picture the ship thrown by the bright moonlight against a clear, dark blue background, every rope and spar white with frost, and a level floe surrounded with a fringe of fantastically shaped hummocks, and it would make a study for an artist. I have remarked heretofore that these wonderful auroral displays are forerunners of cold weather, and I shall watch with interest the result of this very high barometer and extraordinary atmospheric phenomena. Very probably we are lulled by a false sense of security while the ice is so quiet, but I shall undress before retiring to-night, a thing I have done but once since November 13th.

Commenced the issue of lime juice to-day. For the officers it is placed on the dinner-table with water and sugar, and each one sweetens or waters it as he pleases; with the men it is served out by Sweetman, and an ounce of sugar is furnished at the same time, and as the men go to dinner by watches they each receive and consume the ration.

December 3d, Wednesday. — The report of the surgeon's examination is very satisfactory. Of the eight officers the condition of six was pronounced excellent, and of the remaining two (myself and the doctor), good; of the twenty-three men, twenty excellent, and three good. A day of beautiful weather, and although we hear the rumbling of the ice in the distance, nothing occurs around us to disturb us.

December 4th, Thursday. — Were it not for our daily walking exercise of two hours I fear we should stagnate. From eleven A. M. to one P. M., however, all hands are sent out of the ship. The officers generally walk, and the men go hunting, without success, or kick foot-balls. We have a fine, level, smooth place, two hundred and forty yards in length, to walk on, and we manage to put in from four to six miles in the two hours. This is the best of our daylight, for it is quite dark until ten in the morning and after two in the afternoon. Twilight does not make any supply of the absent sun. Danenhower started a school of elementary navigation for the crew.

December 6th, Saturday. — A cold spell has arrived, but as the wonderful auroral display was on the 2d, I fear it is stretching it too much to make a connection with the cold weather. The highest temperature to-day is minus 11°, and the lowest minus 24° (at end of day with N. W. wind). Its effect on the ship was to

keep up a cracking at night up to midnight, caused by the contraction of the metal fastenings and consequent snapping of the wood. We have noticed heretofore considerable hair sticking to the ice, where the dogs in lying down had frozen fast, and had to tear themselves away; but this afternoon a dog stuck so fast that he had actually to be dug out with a shovel. Pretty cold weather!

December 7th, Sunday. — The cold spell continues, the highest temperature being minus 21°; the lowest minus 25°. Inspected the ship at eleven A. M. To my unpleasant surprise I found considerable dampness on the berth deck at the forward and after ends over the berths. The stove, being about amidship, was sufficient to keep the central portion of the deck dry. The forward end communicated with the outer air by means of the skylight leading to the spar deck; which, though covered by the tent awning, received air through a hole in the said awning. The after end communicating by doors, having holes in the lower panels, with the galley room, receives its air from the deck-house, which is kept at an average temperature of 45°, and hence ought not to be as damp as the forward end. In reality, however, it is about the same. Hence I conclude that the condensed moisture is due to the skylight being opened for the forward end, and the same for the after end, with the addition of the spar deck (forward of the deck-house), from its coldness caused by contact with the outer air, serving to condense the warm air below. We have a skylight cover made of galvanized iron, with a funnel, and we will now keep that in place steadily, to see if the moisture will collect in that and freeze, as was the experience of Sir John Ross. In addition we shall also cover the under side of the spar deck with

felt or canvas, or carpet over these forward and after berths and watch the effect.

We are beginning to appreciate other discomforts. Our distilling with the Baxter boiler is not successful, the resulting water being too salt for healthful use. The salt is due to two causes: first, the boiler receives its water from a tank which is filled from the top of the deck-house by drawing water in a bucket from a hole cut in the ice alongside the ship. If greatest care be not exercised (and what sailor will exercise it with the thermometer 25° below zero?) water is slopped over the distilling coil, also on top of the house, and trickles down into the water barrel. A very little salt-water trickling down spoils a half day's distilling, and as we are able to distill only enough to meet our daily wants (say forty gallons), it is a serious matter. It has taken us some days to discover that trouble, and now we will remedy it by rigging a pan to catch drip. Second, the boiler is so shallow that when the pump is started to feed it, if the pump by accident be started quickly, the pressure in the steam space is so suddenly relieved that the water bubbles up and goes over salt to the water barrel through the coil. The same effect is caused by admitting too much steam into the coil; and if we do not admit enough, the coil freezes up and bursts, as it has done several times. If we bring the coil down inside the deck-house, the temperature will not be low enough to condense enough steam for our daily use, and there we are. We have almost scraped the floes bare to get snow enough to melt for washing purposes. The resulting water is very salt, and it was the use of that water which brought on diarrhœa. However, Melville has set to work to improve the distiller, and he rarely misses a complete success.

We also begin to feel the darkness. Four hours' daylight is not much. We have not even the moon now to bear us company. We do not suffer of course, and I notice no diminution of appetite. Everybody rallies around the table at meal times, and is as cheerful as usual. But it is unnatural for us to have this enforced close companionship, and we seem to get in each other's way. We are warm and comfortable, but we would like to be able to go "somewheres." We cannot go out and walk in the dark with any object except exercise, and our two hours' walking match from eleven to one seems to supply enough of that. We read and smoke, and growl at the stove when it does not throw out enough heat, or at the cabin door when it lets in too much cold. The uncertainty of our remaining quiet in the ice for an hour at a time prevents the erection of our observatory, and the taking of interesting astronomical and magnetic observations. We are able to make our hourly meteorological observations only. Our suspicions of the moving of the ice seem to have communicated themselves to the dogs, who come on board regularly to sleep; in fact some of them march up the gang-plank as methodically as we do when it strikes two bells. A few of them, however, remain on the ice to make us chase them, when the ice breaks up, and we are on the anxious seat.

We have had no bear excitements for some time. Fox tracks are plentiful, but no foxes have as yet been seen. Occasionally our hunters report having seen blood where a bear has caught a seal and eaten him; and bear tracks are followed up until daylight fails, and the chase must end. From ten P. M. to midnight we had a beautiful auroral display in the form of loops.

December 8th, Monday. — I am afraid we are on the

verge of another ice disturbance, for at times during the day the ice to the N. E. of us, and distant half a mile, began to move with its usual accompaniment of groans and shrieks while under pressure.

December 9th, Tuesday. — A south southeast gale all day. No movement to the ice.

There is a wonderful sameness to our daily life, and I can as yet devise no efficient way of changing the monotony. We are continually standing by for a movement to the ice with everything ready for an emergency. Knapsacks at hand, sledges packed, boats ready, medicines and instruments, arms and ammunition, sledge parties all told off; all these things keep us in a position of unrest and uncertainty. We seem to feel as if we were living on the edge of a crater. Under the circumstances we can do nothing but wait, thankful each morning that we are no worse off than we were the night before, and yet anxious as to what the day may bring forth. Were we in a harbor and could consider the ship a fixture until spring, we should hardly feel the winter in the many occupations and amusements we should have, but here adrift in the pack we can only wait and watch.

The necessary and inevitable refuse of the ship has rendered our surroundings not at all pleasant to contemplate. If we could only have snow, this might be covered and kept out of sight, but I begin to believe snow never falls here. Although I ought to be glad that it is all outside of the ship instead of inside, I cannot help complaining of the lack of cleanliness of our surroundings.

Melville has made a complete success of the distiller, and now we get our water pure. But it takes two pounds of coal for every gallon of water, and that ex-

penditure will ruin us if we have to keep it up. Snow, snow is what we want.

The sheet-iron cover to the forward skylight, though acting as a partial condenser for the berth deck, does not keep it dry, and we shall have to resort to extra felting.

December 10th, Wednesday. — A very curious addition was made to-day to our naturalist's collection in the shape of the skull (?) and bones of codfish. These bones were picked up by the cabin steward in his walk to-day, between eleven and one, out of a large heap of similar bones, a couple of miles from the ship. They are probably the relics of some successful fishing on the part of a bear or of a fox. Experimented to-day with Snellen's types, to get an idea of the diminution of light. At noon the type marked D = 9, which, under ordinary circumstances, should have been seen at thirty feet, was readable at but twenty feet. Approximately, therefore, we have twenty thirtieths or two thirds of full daylight at noon.

I had placed to-day a series of thermometers in different parts of the ship, and commenced keeping a record of the temperatures; showing the temperatures of the living quarters, of the reservoirs from which air is received in them, and of the open air. For instance, the temperature of the berth deck at ten P. M. was 68°, the old galley-room 45°, the deck-house 49°, the cabin porch 14°, the cabin 51°, the open air 7°.

December 11th, Thursday. — The situation this morning seemed to promise a repetition of our exciting times. Daylight showed a crack in the ice ahead of and nearly alongside the ship, extending from S. W. to N. E. The opening was made so quietly that the watch did not hear any movement beyond a light

shock at 8.40. At ten A. M. there it was however, and by eleven it had opened out to a width of six feet, affording us an opportunity of measuring the growth of the ice since November 25th, the time at which we were squeezed out into what was then open water. By actual measurement to-day we find the thickness of the ice to be twenty inches, and that is direct freezing. For some reason the ice immediately surrounding the ship was not broken adrift, nor even badly cracked on the starboard side of us (ship heading S. S. W. true). At eleven movement commenced. The floe in which the ship lay moved to the northward-where it was broken on its edges by coming in contact with heavier floes, and remained comparatively motionless, after shortening our two hundred and forty yard walk by some forty yards. The ice on our port hand then got under way and moved along slowly, like a panorama, until it had proceeded about two hundred yards to N. E., and then it stopped; the opening six feet wide began to close, and in a few hours everything was quiet again, except an occasional suppressed shriek indicating pressure. The ship was not affected in the slightest degree. While looking around for a cause for this movement we observed the clouds moving rapidly from the S. W., preceded by a scud, indicating clearly a S. W. gale. The barometer had fallen to 29.50, and up to eleven A. M. we had been having six and eight mile winds from the S. S. E. and S. At eleven the wind jumped suddenly to S. W., and commenced to pipe up. Beginning with eight miles, it reached by eight P. M. a velocity of 25.5 miles, blowing at times in heavy squalls at the rate of, at least, forty miles per hour. At midnight it went to W., and was blowing twenty-one miles an hour. The barometer rose with

the change of wind to S. W., and at midnight read 29.80. The temperature, which had gone up to plus 16°, fell rapidly 9° in one hour, and at midnight was minus 8°.

At eleven P. M. we had a very fine auroral display. A wave of light crossed the zenith from the E. to the W. horizon which pulsed regularly in its transit, waving about, however, in its pulsations, like a long streamer of bunting let go in a fresh wind. It is very difficult to give a satisfactory description of these things, and impossible to make a fair picture of them, for no picture can show pulsations of waving light. It requires actual sight to realize their appearance. I have not been able thus far to connect their appearance or non-appearance with any meteorological phenomenon, or with any other unusual occurrence.

December 13th, Saturday. — We have been trying regularly to get sights to determine our position, but are prevented by the almost perpetual haze that intervenes, making a reflection in the mercury of the artificial horizon impossible. In the absence of the moon we have to fall back upon Sumners by stars. Latitude by Polaris is out of our reach on account of its great altitude and the impossibility of getting it with sextant and artificial horizon.

December 14th, Sunday. — A variety of winds and weather to-day. At eleven A. M. made the usual Sunday inspection. Every part of the ship was in as good order and condition as can be expected where our cleaning is limited to scraping and an occasional wiping up with cloths and warm water. As to dampness there is cause for complaint. The cabin and ward-room are dry and comfortable, the deck-house is damp, and in places wet from the tracking in of slush and dirt from

the ice and its melting by the heat of the Baxter boiler, and also from the moisture created while the distilling is going on, and the berth deck is damp to a slight degree on the beams and ship's side in the wake of the forward and after berths, as described in my remarks of last Sunday. Felt and canvas have been used freely during the week to try to stop this dampness, but it still exists, and I do not think any means would be effectual short of building a house over all the deck, chock forward to the bows. To be sure we are troubled with dampness to the same extent as previous expeditions, but then we have not had as yet such extremely low temperatures. We are able to keep all the slop of washing clothes and persons clear of the living deck by having all that done in the deck-house; and as the men do not enter the berth deck directly from the open air, we have no cold air rushing in and being spread around. As all work is done in this deck-house, and the men's fur clothing and knapsacks are kept there, there is no room occupied on the berth deck save for eating and sleeping purposes; and as the carbonic acid estimates are not now extremely bad, we can put down the slight drip as the only objectionable feature as yet to our winter experience, so far as general health and comfort are concerned.

If life within the Arctic circle were perfect comfort, everybody would be coming here. We must be thankful that our discomforts are no greater. Everybody is in good health and in good spirits. There are individual cases of feeling the time hang heavily, and of being mentally "out of sorts;" but this arises, I fancy, from the non-realization of an impossible scheme of Arctic cruising and life rather than from any effect on the general health. Excepting Mr. Dunbar and Ninde-

mann no one has passed a winter in the Arctic before. Mr. Dunbar's experience has been limited to a winter in Cumberland Gulf, where his ship was in a snug harbor, and communication could be had and was had with the natives. Nindemann's experience covers one winter in the Polaris in Thank God Harbor, and his terrible winter-drift on the ice-floe and miraculous rescue. For the rest of us it is our first experience; and when we add to our wintering in the pack, with all its uncertainties and terrors, the knowledge that we attained no high latitude our first season, made no discoveries, so far as we know have made no useful additions to scientific knowledge, we cannot help feeling that we are doing nothing toward the object of the expedition, and are consuming provisions, wearing out clothing, and burning coal to no purpose. However we cannot tell what may be in store for us, and in our ignorance it is better to hope for good results than to pass our lives in fearing bad ones.

New ice has formed twenty inches in thickness around us, and salt has been deposited on its surface by crystallization. What the certain thickness may be at which the ice is almost free from salt I know not, and Weyprecht does not say. But with a saw we cut from a thickness of sixteen inches of ice four pieces, each four inches thick, in regular succession, melted the ice, and the resulting water was so salt as to be unfit for use. I will try this experiment with an eight foot floe in a few days, and inscribe the result in this record. Without evaporating the water, and weighing the remaining salt, I could not say what the exact degrees of difference were, if any, between the several four inch layers; but by the nitrate of silver test the water turned white in each case to the same degree,

and the bottom layer made water as unfit to drink as did the surface layer containing the crystallized salt.

December 15*th*, *Monday*. — An uneventful day. The Snellen type test seems not a good way to obtain even a comparative record of the intensity of our daylight; for whereas we could read a certain kind of type at a distance of twenty feet on the 10th inst., we can to-day read the same type twenty-seven feet, and yet the circumstances of sky and weather seem exactly the same.

December 16*th*, *Tuesday*. — As far as it is possible to do so, we are beginning to have some confidence in the stability of our position. We have had such a quiet time with the ice lately that we feel quite confident and reassured. So much so that we contemplate neither a breaking up of the ice nor any treachery while we are walking over it. As if to show us, however, how particularly deceitful our surroundings are, Collins and two men broke through the ice to-day at different times and places within a radius of three hundred yards from the ship. No harm resulted beyond a ducking, from thus involuntarily taking the temperature of the surface water. Highest temperature, minus 11°, lowest minus 26° (our lowest thus far).

December 18*th*, *Thursday*. — This morning we discover a large opening in the ice about five hundred yards to the northward of the ship, about one quarter of a mile in width and extending east and west. This is bringing the uneasiness close home.

At five P. M., by a meridian altitude of the moon and an altitude of Mars, Danenhower establishes our position in lat. 72° 27′ N., long. 178° 23′ W., showing a drift of eight miles to the W. 21° S. since December 2d. We seem to be, therefore, in a comparatively quiet part of the ocean.

December 20th, Saturday. — Measured the thickness of the ice again to-day. The growth of the new formation, from November 25th to December 11th, was twenty inches; to-day the same ice measured in the fire-hole is thirty inches, showing an increase of ten inches in ten days.

This afternoon we had a slight crashing and moving of ice to the northward of us, but it did not last very long and gave us no concern.

Nindemann brought in a seal to add to our delicacies.

December 21st, Sunday. — A blowy day.

December 22d, Monday. — The shortest day in the year. Although we cannot say, "Now is the winter of our discontent made glorious summer," we can say that our Arctic night is half gone, and that we shall now have an increasing light to contemplate instead of a failing one. The earliest sign of a gleam of daylight was at 8.40 A. M., but of course it was nothing to speak of. At 9.15 one could be sure that there was a sun somewhere; at twelve that we had daylight to, and 60° beyond, the zenith to the northward; at one that day was fading; at three it had faded, while at 3.40 not a speck of twilight was left to us. At noon Snellen's types, which are ordinarily read at thirty feet distance, were distinguishable at twenty-three feet; perfectly favorable conditions of atmosphere, the types held towards the south. Though this is but an approximation toward measuring the amount of twilight, I know of no better. As we had the bright light of a moon nine days old, and 18° in N. declination, our light was mixed even as late as an hour before and as early as an hour after noon. But that the daylight was stronger than the moonlight was proven by the fact that, in walking, our shadows were thrown from the

daylight and not from the moonlight. Well, here we are in the pack. So far, with two exceptions, we are in good health. The two exceptions are Mr. Danenhower and Mr. Dunbar. Mr. Danenhower has an inflammatory trouble with his left eye, which obliges him to keep it blinded, but is of no very serious character. Mr. Dunbar has caught a bad cold which has run him down considerably, and as he says he never was sick before it seems to depress his spirits to be ailing now. Some of us are troubled with extreme sleeplessness, myself, probably, worst of all, or, at least, as badly. My work not being over until one A. M., at which time I retire, I rarely get asleep before 3.30, and sometimes not until four A. M. I avoid napping as a rule during the day, but it seems to make no difference. The lack of sufficient exercise may be the cause of our wakefulness. As an electrical celebration of the shortest day in the year, we had a display of auroras far exceeding in quantity, and, perhaps, also in quality any previous efforts in that line.

December 23d, Tuesday. — The high winds of the last few days having accumulated some snow near us we set to work to-day banking it up against the ship's side, with the hope of adding to her warmth and diminishing the dampness of the berth deck.

December 24th, Wednesday. — A day of high winds, cloudy and unpleasant weather, and occasional flurries of very fine snow.

Christmas Eve. Our surroundings are not of the most cheerful character, and our ship is not large enough to make any effort at theatricals possible. A feeble attempt at minstrels was in contemplation during the past week, but it has not yet matured. In order that some little conviviality and good feeling might be

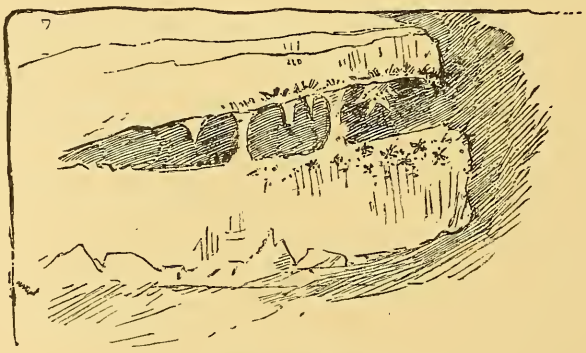
occasioned or encouraged, I served out three quarts of whiskey among the men in the evening, which seemed acceptable, and Melville mixed a fine compound from Irish whiskey presented by Paymaster Cochran before we left, and with one exception we joined aft in drinking to a merry Christmas to absent ones and to the health of Cochran. Danenhower proposed and we drank to the health and success of "our old shipmates" (Mrs. De Long and Sylvie), and so in the interchange of yarns and recollections we welcomed in the Christmas Day with the hope that at its next coming we should be at least no worse off.

Christmas, December 25th, Thursday. — A cloudy, dark, and disagreeable day, with high winds and light snow. The winds veer and haul between E. N. E. and S. E., with velocities ranging from eighteen to twenty-six miles an hour, temperature rises from minus 2° to plus 7°, soundings at noon in thirty-one fathoms, indicate drift to W. S. W. While the winds were blowing at midnight from S. E., the clouds, cirro-cumulus, were driving across the moon's face from the S. W. The same occurrence was noticed by me last night and the night before.

Christmas Day! This is the dreariest day I have ever experienced in my life, and it is certainly passed in the dreariest part of the world. And yet we (or rather I) ought not to complain, for it is something to have had no serious mishap up to this time. We tried to be jolly, but did not make any grand success of it until dinner time, when fore and aft we had such a grand banquet that we were for a time lifted out of and beyond the contemplation of our surroundings. We should have been comparatively happy were it not that one of our mess did not appear at the dinner table. At four P. M.

the crew, headed by Boatswain Cole, came aft into the cabin to wish us all a merry Christmas, and to invite us into the deck-house to hear a little music. We thanked them for their courtesy and went to the deck-house, where they played music, sang songs, and Alexey gave us a native dance. At all events the crew seemed to have a merry Christmas.

December 26th, Friday. — At 10.15 P. M. a sharp crack was heard on our starboard side, and on going on deck to look for a cause open water was discerned ahead and on our port side to the eastward about three hundred yards distant. I went out to it and found that



A Peculiar Ice Form.

the ice had opened into a channel about twelve feet wide, extending for about a mile north and south, and curving around our bow to some new ice made over an opening of yesterday. I must now believe that this ocean is subject to tidal action, for as all our pressures have been at or about the times of full and new moon (full moon, October 29th; new, November 13th; full, November 28th; new, December 12th; full, December 28th), they can be traced to the greater movement due to the spring tides, as suggested by Chipp, on October 31st.

December 27th, Saturday. — At five A. M., a light halo with prismatic colors; at six, a lunar circle; at seven, a faint aurora to N. E.; at eight, a halo. At 11.30 A. M. there was a slight movement to the ice beyond and along the opening of yesterday.

December 28th, Sunday. — From 5.10 to 5.25 A. M. there was a slight eclipse of a portion of the moon's lower limb. If we had been able to have our observatory in working order on shore we might have made exact observations of this occurrence. But as we are in our uncertain state in the ice-pack, we can do no more than note the fact of an eclipse having taken place. At one P. M., held divine service, only four beside myself attending.

In the afternoon one of our dogs began to act queerly, seemingly bereft of all power of motion. Supposing that he might by some chance have become frozen we had him carried on board and laid on felt in the deck-house. He still declined to make any exertion, and his jaws were locked together, while his eyes were fixed and expressionless. In the evening the doctor injected ammonia into him with small effect.

December 29th, Monday. — A slight grinding movement in the neighborhood of the late opening of the ice to the eastward at 10.10 P. M. At noon there was something appearing very much like land between S. by W. and a half W. and S. W. and a half W. We believed that we saw an increase in the amount of daylight already at noon. To-day the sky had quite a rosy tinge at the southern horizon, and the light was almost sufficient to have an effect on the sky to the northern horizon. A full moon, nearly on the horizon, at its northern culmination, made it impossible to say where the daylight ended and the moonlight began.

The dog mentioned as being sick died during the night, and we have now but thirty-eight left, and one of these is dying slowly, too, having been bitten through the nose in a fight at St. Michael's. Alexey opened the dead dog, and found in his stomach a wad of oakum as big as my fist, which of course caused his death. These dogs will eat anything, and in spite of all attempts to prevent them. They are given a dried fish each daily, but all the same are prowling around day and night among empty meat cans and ash heaps, and making a rush every time a pan of dish water even is thrown over the side.

December 31*st, Wednesday.* — The last day of the year is, so far as weather is concerned, dull and gloomy. The earliest trace of dawn occurred at 8.16 A. M. Occasional flurries of snow, very fine and driving, seem to promise us some relief from our expenditure of fuel in distilling, but as soon as we begin to think it really will snow, the snow flurries cease.

Danenhower was placed on the sick list to-day, his eye having regularly broken down.

To give an impetus to the social feeling in seeing the old year out and the new year in, I sent four quarts of brandy forward for the crew, while Melville heated the water for a savory compound aft, and as midnight approached our little colony of thirty-three people waited for the sound of the ship's bell to say good-by to the year 1879, and welcome to the year 1880.

1880, *January* 1*st, Thursday.* — The birth of the new year was announced by the rapid ringing of the ship's bell by the man on watch, and the crew, all assembled on the quarter deck, gave three cheers for the "Jeannette," and sent a deputation of two men into the cabin to wish us all a happy New Year. The year opened

clear and pleasant. The temperature began at minus 24°, but at four A. M. it dropped suddenly to minus 30°, and by eleven A. M. it had reached minus 39°, running along at that steadily until midnight, when it reached minus 39.5°. The temperature was probably lower, but the mercurial thermometers began to freeze, and the spirit thermometers did not record accurately at this point.

At three A. M. we had a lunar circle showing faint mock moons, the lowest mock moon very bright. Through the real and two lateral mock moons a curved line passed toward the horizon. At nine P. M. a blood-red halo around the moon. Early daylight at 8.14 A. M. Sounded at noon in 30½ fathoms. Owing to the low temperature and strong wind blowing, I suspended for the day the operation of my regulation making everybody leave the ship and exercise on the ice from eleven A. M. to one P. M.

At three P. M. everybody sat down to a capital dinner, and afterward we got ready for the minstrel performance in the evening. Our men had rallied from their failure to get up one for Christmas, and seemed determined to make this entertainment good enough for both occasions. During the day invitations were sent aft, accompanied by programmes. At 8.30 one of the men came to the cabin and invited us into the deck-house. Entering, we found a nice little stage erected with drop-curtain, footlights, etc., and tastily decorated with flags. The performance commenced with a minstrel variety, jokes and conundrums sandwiching in with the songs. One conundrum was excellent (pointing to one of the stanchions of the deck-house): "Why is that stanchion like Mr. James Gordon Bennett? Because it supports the house." Sweetman's songs were

very good, and Kuehne's violin solo was fine indeed, especially when one takes into consideration the fact that a seaman's life does not serve to render the fingers supple and delicate. Mr. Cole gave us a jig with all the gravity of a judge. One of the features of the evening was the reading of a prologue composed by Mr. Collins, in which each one of the crew was made the subject of a rhyme in turn. Alexey and Aneguin gave us native dances, and the latter an imitation of a song sung by our Chinamen. The Chinamen gave us their native song, and a sham fight with knives and a pole, winding up by imitating with much contempt Alexey's and Aneguin's manner of singing and dancing.

Instead of shadow pictures we had *tableaux vivants*, "Neptune" (Cole turning a wheel, our broken spare one, mounted on a camp stool); "Sailors mourning over a dead marine" (two sailors mute with grief over an empty brandy-bottle); "A glimpse at Vulcan" (our prize blacksmith, Dressler); "Queen Anne" (Aneguin — Anne Gwyne — Queen Anne); "Is that a bear I see?" (Alexey with dog, aiming at some unseen object); "Mars" (man on crutches); "Taking an observation" (man drinking out of uplifted bottle), were all capital. When, the performance over, we broke up at eleven o'clock, we all felt satisfied alike with the ship, the minstrels, ourselves, and the manner in which we had celebrated the first day of the year of our Lord 1880.

January 2d, Friday. — A startling meteorological fact can be recorded to-day. We have seen some pretty high barometric readings, but to-day's experience goes far beyond anything ever seen by our party. The pressure began at 30.64, but it rose to 30.85 at noon, and at midnight had reached 13.13. These readings

are reduced to a temperature of 32° Fahrenheit. The thermometer remained uniformly very low, the highest being minus 37°, and the lowest 39.5°.

There is, no doubt, a heavy blow going on to the southward of us. For us the accompaniments of this high barometer and low temperature were a westerly wind veering, going to N. and ending in perfect calm, and almost entirely cloudless sky (a few light streaks to southern horizon being the only clouds), and no unusual electric disturbance. In fact, the auroral displays were quite ordinary. A lunar halo was also observed at three A. M., but it had no especial features. At daylight numerous water clouds were observed around us, but they disappeared during the forenoon as the ice closed. At ten P. M. the ice commenced grinding near us in the S. W., the motion, judging by the sound, being transmitted along a line running to the northward. What I mean by that is, that when the ice moved first it was in the S. W.; then the next sound was from S. W. by W., while in the S. W. it was quiet; so on to W. and along, the sound retreating to the northward. No motion was communicated to the ship or to the ice surrounding her. The noise was exactly like the paddle-wheels of a steamer beating the water, sometimes at full speed, and sometimes at half speed — even as it may be heard on a still night on the North River at home.

Every once in a while during this cold snap, we are startled by a loud crack like a rifle shot, caused by the drawing of some fastening. That we have not had more of them may be due to the extra secure manner in which our ship is built; for Mr. Dunbar seems to have experienced much more of this kind of noise in wintering in a whaler in Cumberland Sound.

January 3d, Saturday. — Early daylight at eight A. M. At noon good clear daylight illuminating the floe, and showing everything about the ship distinctly. Anemometer read clearly without lantern for the first time in many days. The southern sky showed bright red. The loom of land was descried to the S. S. W. At one A. M. the ice was again in motion to southward.

January 4th, Sunday. — At 12.30 a very brilliant meteor shot in a curved line from S. to S. E. and exploded like a rocket, showing red, yellow, and blue colors. At eleven inspected the ship. The berth deck at the forward and after ends is again beaded with moisture. The experiment of laying old mattresses on deck on the forecastle and covering them with snow worked to a charm for a day or two, the berth deck being dry and comfortable, but it has broken out again as bad as ever. The fore store-room is dry, and, as far as we can see, entirely free from frost; but this is explained by its being covered by the deck-house. The after store-room is full of frost, and will have to be thoroughly broken out in the spring. The ward-room is dry and free from frost except the side bulkheads of the forward rooms (Danenhower's and Collins'); the forward bulkheads being felted are quite free from frost. Several of the officers discovered during the week that their mattress covers (ticking) had commenced to mildew and rot, moisture having collected between their mattresses and the berth bottoms. This has been remedied by each one turning up his mattress to air in the morning upon getting up, and airing it on Saturdays when the fire is lighted in the ward-room to heat water for bathing purposes. The cabin is dry, warm, and comfortable. During our two hours' walking exercise on the floe from eleven A. M. to one P. M., it is opened and

ventilated the whole or part of the time, depending on the temperature, and though we sometimes find it cold upon our return on board, that drawback is more than compensated for by having had the air changed.

Our little mess is pulling through the winter fairly well. Mr. Dunbar is getting back to his usual good condition, but Mr. Danenhower is having a hard time with his eyes, the inflammation being so great that he cannot bear any light to fall upon them. The rest of us are up to our usual standard. At one P. M. read the Articles of War and mustered the crew. After which performed divine service.

January 5th, Monday. — This morning the doctor came to me and represented that Danenhower's case was of a very serious character, and that there was great danger of his losing the sight of his left eye. Owing to the necessity for shielding the eye from all light, it would become necessary for Mr. Danenhower to remain in his room in total darkness, and it was feared that this might affect his general health and depress his spirits. I am much distressed at the news, for Danenhower is highly prized by all of us, and by his efforts has kept us many an hour from moping. He is now shut out from all participation with what is going on, and we can do nothing but go down occasionally and sit with him in the dark and talk with him. He is cheerful enough himself, however, and, having great force of character, has made up his mind to accept the situation and fight it out patiently.

January 6th, Tuesday. — The surgeon handed me to-day his report of the result of the monthly examination. He considers the condition of the majority of the officers and men satisfactory. His opinion of Danenhower's case I recorded yesterday. Several of the

officers and men complain of sleeplessness, which I have also previously noted. Of the thirty-three officers, seamen, and natives, twenty-three are in excellent condition; eight are in good condition; one is in fairly good, and one in poor condition — so that I think we are in no very serious amount affected by the endurance of the Arctic winter.

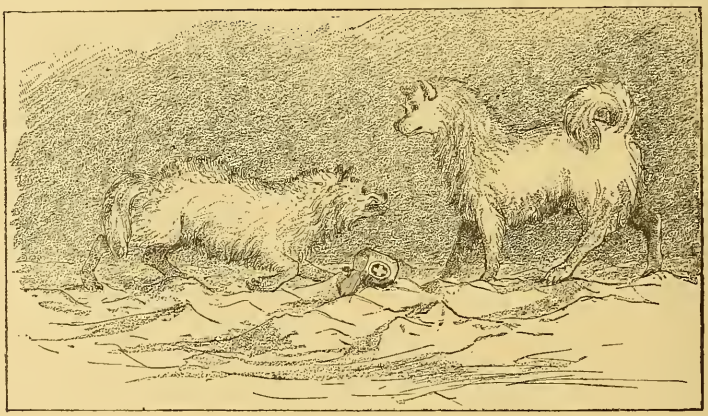
January 8th, Thursday. — Danenhower's case still excites uneasiness in the surgeon's mind. The best that can be said of it is that it grows no worse. As it is already very bad, there is but little comfort in this knowledge. This continued confinement in a dark room may prey upon Danenhower's mind, although thus far he has borne it bravely.

January 12th, Monday. — At two A. M. a slight ice movement to westward. At 1.15 P. M. a sudden sharp crack made the ship jump one quarter of a point in azimuth. Supposing that we were in for a time, I ran out on deck, but found everything surrounding the ship in its usual quiet. About eight hundred yards to the southward, however, there was the sound of grinding and crushing, and this movement no doubt was the cause of our getting a sudden nip and consequent scare. Knowing that all our trouble came at new and full moon, and that we had a new moon yesterday, I stood by anxiously all the afternoon and evening for some further demonstrations, but nothing occurred, and we were able to go to bed in peace and quiet. From the sudden lowering of the temperature, I am inclined to think we are going to have another cold snap.

January 13th, Tuesday. — My expectations of a cold snap have been realized, — the thermometer, which began at minus 24°, having gone down steadily to minus 35° at nine P. M., and only risen to minus 32° at midnight.

This cold snap followed very closely the new moon, and I observed by looking back in the journal that our other cold spell occurred at about the same time after full moon, which I had been led to expect by the remarks of Dr. Kane, McClintock, and others. At the full moon instance our mercurial thermometer indicated minus 39.5°, which is 4.5° colder than our new moon experience. The weather to-day was remarkably clear and beautiful. From six P. M. to midnight the sky was absolutely cloudless, and the southern horizon seemed as clearly defined as a knife edge. The delicate new moon a little above it, the stars bright and cold, the absolute calm, made a picture such as one was forced to linger over in spite of danger of freezing nose and face. Turning about, an equally beautiful picture, but of a different kind, met the eye, — the ship. For the last two days there was considerable moisture in the air, which was deposited on our rigging in rime and light fluffy masses like down. Freezing there immediately, of course, every rope and spar seemed made twice its usual size; and this evening, after gazing at the perfect picture which nature gave us of a midwinter night, to turn around and look at the ship was to feel that she had dropped out of fairy-land in her pure whiteness, and was too — Well, I can't say what I want to. These outbursts are too much for me; I commence them, and cannot finish them; I seem to know the tune, but can never remember the words. Occasionally I go out on the ice on these beautiful evenings, and try to make words express my feelings suitably; but a lot of dogs wrangling over an empty meat-can, trying to find a meal in it, surround me, and drag me down to plain matter of fact. So I take my half-frozen nose tenderly in my hand, and lead myself back on board ship.

At 9.15 P. M. the quartermaster came in to report heavy grinding and movement ahead of the ship to the S. S. W. Seizing a lantern I rushed out upon the floe, accompanied by Alexey, and from the horrid din and screeching of the ice I thought the commotion could not be fifty feet from us. Alternate the howling of a gale around the rigging of a ship with the beat of the paddle-wheels of a hundred steamers, and you will have a good idea of what this noise sounded like. Not feeling any trembling to our floe, I concluded to look further for the disturbance, and so went on. After going about one thousand yards and crossing two cracks my



A Quarrel Over a Meat-Can.

lantern went out. We were not up to the disturbance yet, and the noise was quite as great. After floundering and stumbling around for a while, I decided to return and await events nearer home. Alexey and myself, after rolling over and over a dozen times or more in the darkness, made our way back, and finding no disturbance at the ship, we dismissed the subject contemptuously as "plenty noise, small move." At eleven the noise and movement had passed off to the eastward,

and were growing faint in the distance. The carpenters commenced to-day the building of two more sleds, to carry our cutters in case we have to abandon the ship, which God forbid.

January 14*th, Wednesday.* — Excepting a little additional movement in the distance to the S. W., the ice gave us no alarms. But at its best, it is so treacherous that we never feel safe. I went with a dog sled several miles around the floe and saw a few openings, already frozen over, but these are the only signs of recent movement. The big piles of slab ice heaped up here and there are the results of the great November confusion which broke us adrift and floated us to our present insecure berth.

January 15*th, Thursday.* — We have had considerable anxiety to-day on account of the ice. At noon a slight shock was experienced, and on going out on the floe I found that it had cracked and opened about twenty feet from our starboard side (ship heading S. S. W. and a half W.), the crack rounding the bow and going ahead in the prolongation of the stem in one direction, and in the other, passing along, it went across the stern at a distance of about one hundred yards. This crack widened, until at three it had become eight feet in width, and at the same time a fissure appeared on our port side about one hundred feet distant, which became an opening at six. As far as could be observed, the general direction of the ice movement was to the E. and S. We were not disturbed beyond an occasional snap, as some fracture took place in the ice, but this horrible uncertainty grows wearisome. Living over a powder manufactory may be exciting, but it is not healthy excitement; and our constant state of anxiety may well be compared to it. As the daylight left us,

at four, our position was within a small floe with water all around us. Of course, the ice will close up again, and then it is a question of strength. If the small floe is squeezed on two sides it will collapse, and then the ship gets the pressure; if squeezed on one side it will go to the main floe on the other, and the edges will break up and pile up until the broken masses reach the ship's side. In any case, the ship comes in for some unpleasantness, so there is not much choice. Ice forty inches thick is a powerful enemy but a weak defender.

January 16th, Friday. — Although the wind did not attain a high velocity, it seemed to be peculiarly searching and very loud. While we have been able to take our usual walking exercise with less wind and minus 29° temperature, to-day a temperature of minus 16° was unbearable. I accordingly dispensed with the enforced exercise, although I make it a general rule to keep it up as long as the thermometer stands above minus 30°.

At 12.30 A. M. the familiar grinding and groaning made itself heard on our starboard side. Examination showed that the floes which separated yesterday were coming together again, and breaking up the new ice which had already formed in the crack. Beyond an occasional jar and shock, the ship did not move. At three the ice again began its movement, and this continued at intervals all day until seven P. M. Jars and shocks were frequent, but the ship did not move, keeping the same heel 2½° to starboard, although she was receiving considerable pressure on her underwater body. We had, therefore, nothing to worry us but a constant state of tension and anxiety. The auroral display was extraordinary.

January 17th, Saturday. — The day opened pleasant and clear with a N. W. wind. The barometer rose stead-

ily from 29.62 to 30. The temperature ran down rapidly, giving us our coldest experience thus far, — beginning at minus 21.5°, it ran steadily down to minus 42° by five P. M., at which temperature our mercurial thermometer, No. 4,313, froze solid, and declined to go down any further. Mercurial thermometer No. 4,274 kept on, however, and accommodated us at midnight with a reading of minus 44.5°. The two spirit thermometers were slow to realize how cold it was, for No. 4,402 had got only to minus 42° at midnight, and 4,397 to minus 41°; but they may do better hereafter. The weather has been beautiful all day, scarcely a cloud and but little haze preventing the sky from being perfectly clear. Excepting a slight movement ahead of the ship at seven A. M. the ice let us alone, giving us calm minds to enjoy the cold and the auroral display. Early daylight at 6.55 A. M. As we have had so much clear weather we have seen nothing of the land to the southward. The refraction has caused it at other times to be lifted so much above the horizon that we have been quite misled as to its distance. By our last determination of our position, we are one hundred miles to the northward and eastward of Wrangel Land, supposing its position to be correctly defined on the chart, and yet when we last saw it it was hard to believe it more than fifty miles away.

A careful measurement of a portion of the turned up floe broken off in the late squeeze gave us a thickness of forty-six inches, the result of direct freezing since November 28th.

January 18th, Sunday. — I inspected the ship at eleven A. M., and found the berth deck fairly dry. By watching the moisture carefully, and wiping it off whenever it appears, the berths are kept dry; and by airing

the mattresses weekly in the deck-house, and turning them up from day to day in the berths, I think we avoid any evil consequences which might be produced by damp bedding. At one P. M. I read divine service in the cabin.

January 19th, Monday. — A day of great anxiety and trouble. At 1.30 A. M. there was a loud noise as of the cracking of the ship's frame from some great pressure. I was sitting in my room at the time, and the sound seemed to come right abreast of me. I subsequently learned that a similar sound had been heard on the berth deck about abreast of the foremast. I ran out to look for a cause for this noise, but could see nothing. The ice was perfectly quiet, and no evidence of anything wrong could be found about the ship. After waiting an hour for further developments, nothing occurring, I turned in, supposing it might have been a bolt drawing by reason of the extreme cold. At 7.45 the wind suddenly shifted from N. to W. N. W., the ice began to move, and, amid the groaning and grinding of the floes, the ship was felt to receive tremendous pressure. The line of ice movement appeared to be at the break across the bows which occurred December 11th and closed up the same day. But the ice, while moving along slightly to the eastward, came down toward the stem, broke off large pieces of floe at the old fracture, and, piling up these masses under the stem, brought a tremendous longitudinal pressure on the ship. The ship being firmly imbedded in the floe, and held firmly on all sides, could not, of course, go astern, nor could she rise, although her curving bow was in her favor, and in consequence it became a question of her fore and aft strength. As she had stood an equally severe pressure on her sides (much weaker places, of course), I had

no particular fear; and when I saw the floe on her port side buckle up and break in long thwartship cracks, and then the movement and pressure both seem to cease, I believed that we had weathered one more nip.

At 10.30 A. M. when the men went down in the fire-room at the daily serving out of coal, Sharvell heard the running of water in the bilges, and promptly reported it. An examination was made at once, and we discovered that water was flowing from forward. Following it up we found to our dismay that there were two streams of water an inch in diameter, flowing through the filling which had been put in below the berth deck at the Mare Island Yard; and that the water stood at a depth of eighteen inches in the fore-peak, at twenty-four inches in the store-room, next abaft it, and thirty-six inches in the fore hold, while in the fire-room it was over the floor-plates on the starboard side. The deck-pumps were at once rigged and manned, and I ordered steam to be raised on the port boiler to run the steam-pump. While one watch worked the pumps, the other watch were put at work breaking out the fore peak, hoisting the flour out of the store-room next abaft it, and breaking out the fore hold. To my great relief the pumps seemed to hold their own. The forward bilge-pump (the only one worked) being in the deck-house, the men were sheltered from the intense cold, and were able to work to advantage. We had great difficulty in getting the use of the steam-pump. In the first place, the sea cocks being frozen we could not run up the boiler from the sea, and hence had to resort to pouring water from buckets through the man-hole plates. The temperature of the fire-room was then minus 29°, and we were a long time in getting the pump in a condition fit for use. But by Melville's

indomitable energy it was ready by three P. M. Up to this time we had carefully kept the gates of the forward water-tight bulkhead closed to keep the water in one compartment, but when steam was ready we opened them. The water did not flow aft readily, however, the limber holes under the coal bunkers being frozen or otherwise choked up. Such water as did come aft was pumped out by steam through the fire hose connection on deck, and by hose through a scupper; our steam-pump suction was on the port side, and the ship being heeled 2½° to starboard, the greatest amount of water came aft on the starboard side. Hence the steam-pump could work only when the water rose above the keelson, and washed over to port. I kept all hands on deck until midnight, and then sent one watch below; and, in view of the hard work everybody had been called on to perform, I served out two ounces of brandy to each man. Nindemann stood down in the fore peak up to his knees in water, stuffing in oakum and tallow into every place from which water came. As fast as he stuffed it in below the water came out above; and when finally he got so far that but a little water trickled out from the bow-filling, it forced its way out through the ceiling. We put Alexey and Aneguin to work digging out the ice under the bow, to try to find out where the injury was and of what nature. But after they had dug away some of the pieces which had been piled up, the water flowed over the ice beneath and froze, and effectually stopped work. No sign of injury could be seen outside, and nothing inside but the flowing of the water, and, as far as may be judged from appearances, it would seem that the ship's forefoot has been broken off or twisted, starting the garboard strakes. Until we can free the ship from water we can

do nothing towards building a water-tight bulkhead across the fore peak, and thus keeping the water leak under control of the hand-pumps. As the water will not come aft readily to the steam-pump, we must get a steam-pump forward to it, for men cannot stand pumping from now till spring. Fortunately we have a pump in the engine-room which we can move forward to the old galley-room and connect by a long series of pipes to the main boiler, and that is suggested by Melville and commenced to be put into execution at midnight.

Everything was carried on regularly, quietly, and systematically. There was no excitement and no confusion. If we had to leave the ship, our sledges were ready on the poop packed with forty days' provisions, our boats were ready to lower, and we had the two dingys mounted on their sleds. Everybody had his knapsack and sleeping-bag ready, and our records and papers were in condition to seal up in a box, but thank God we had no occasion to experience that emergency. Temperature slowly rises to minus 44°. Early daylight at 6.50. Clear and pleasant. Bright moonlight and starlight. Considerable ice movement during day, and continuous heavy pressure.

January 20th, Tuesday. — A very disagreeable feature in connection with our trouble is, that we have a sick man on our hands (Danenhower), and his being unable to help himself, in case of an extraordinary emergency, makes it a cause of serious anxiety to me. The doctor was suddenly taken ill last night with a bilious attack, and for a time I was quite alarmed about him. But this morning he seems to be on the mend. Mr. Dunbar is not strong yet, his recent sickness seeming to have added twenty years to his age.

While we are in this uncertain state, there is not

much rest for Chipp, Melville, or myself; and among the men, Nindemann, Cole, and Sweetman seem to be as unwilling to take rest as ourselves. The last named is not very strong, and I fear would not stand a heavy strain. But Nindemann seems to know no such thing as fatigue. We do not gain much on the water, but then the water does not gain on us. The auxiliary steam-pump has been moved from the engine-room to the old galley-room, and secured in place against the berth deck bulkhead. Several repairs were made to it, such as fitting new valves, etc., but we had not finished running the line of piping to it from the main boiler by the time the day closed. A connection will be had with the main boiler through the steam-whistle pipe. As soon as we got the auxiliary pump in place we attempted to run it by the Baxter boiler, but the pump was too much for it, taking away all its steam almost immediately. The forward bilge-pump is worked by the watch, and at times we get the water down so low that ten minutes' pumping and ten minutes' spell keep the water in check. The flow of water aft to the engine-room is freer, enabling the steam-pump to be run fifteen minutes in every half hour, giving a breathing spell to the men. The boiler-pump exhausts into the bilge, and the feed water is taken from the bilge, all the sea cocks being frozen fast in their seats.

We cannot expect to free the ship by the hand-pumps alone, and are waiting for the aid of the auxiliary steam-pump. It may seem strange that so long a time is required to get this in operation, but our difficulties are enormous. To take a steam-pump down, move it, and put it together is a long job alone, without speaking of running steam-piping, all of which has to be fitted. Every man has been worked up to the top

notch of his strength, whether in engine work, at the pumps, or carrying provisions aft; and though there seems but little described on this page, the day has been spent in harder work than falls to the lot of most men. Still everything is done quietly and with precision, and aided by Chipp and Melville, whose superiors the navy cannot show, with their untiring energy, splendid judgment, and fertility of device, I am confident of being able to do all that man can do to carry on the expedition to a safe termination.

Considerable ice movement and pressure during the day. The ship has increased her heel to three degrees to starboard, and floe and ship have swung to south by west one and one fourth points. Light breezes between S. and W. all day, and temperature struggling up from minus 44° to minus 37°. The movement of the ice seems to be to the eastward. There are numerous ridges in sight where the floes have been broken and piled up upon coming in contact. The floe around the ship remains as yesterday, but when pressed yields in heavy surges which cause the ship to snap and crack. A careful examination shows no sign of anything being strained or broken inside below, in spite of the pressure; and from watching the incoming of the water we are still of the opinion that the injury to the ship consists of the breaking of the forefoot and the starting of the garboard strakes.

January 21*st*, *Wednesday*. — The work of running the line of steam-piping to the auxiliary steam-pump in the galley-room was completed by one A. M. The steam-pipe was, as I have before said, led to the steam-whistle pipe, which of course communicated with the main boiler. Upon turning on the steam the pipe was found to be frozen, and steam would not pass. We

had, therefore, to take down the pipe and thaw it out. This done, we tried again and got the pump to work, but found the suction pipe too small. We then removed the bilge suction pipe from the main engine and attached it to the auxiliary pump, and then the pump worked all right to my great satisfaction, for I was able to give our tired men a rest.

It was seven A. M. when we got the auxiliary pump running, but we immediately succeeded in keeping the water in check. By four P. M. we had got so much ahead of the water that the fore peak was dry enough to commence building a small bulkhead abaft of the bow-filling to stop the leak there to some extent. The water seemed to flow aft to the engine-pump more readily to-day, and by pumping fifteen minutes in every half hour in the engine-room, they kept that part of the ship free. Occasionally we would even get the auxiliary pump to suck, and we then drove plugs in the holes which we had bored in the forward bulkhead of the fore hold, and thus blocked up water enough to keep the auxiliary going all the time. This gave a spell to the men in the engine-room, and Melville (who will not sleep or rest) set them to work to make the necessary forgings for his proposed connection of the Baxter boiler to the forward spar deck bilge-pump.

There was considerable ice movement during the day, and tremendous pressure. The ship received many severe shocks, but these did not seem to increase the leak. I am rather inclined to think that a broken piece of floe has been shoved under her, and that she has been lifted above some of the pressure. She has risen two inches above her old line of flotation, which we have determined by marks made where her snow embankment came originally. The ship heels 3° to star-

board. I am a little afraid that there may be some accident to the stern-post and rudder-post from this excessive longitudinal pressure, although the fullness of the ship's counters may receive and take up a great deal of the strain.

Much hard work falls upon two men, Nindemann and Sweetman. These two have to take turns about in standing in the water in the fore peak, building the bulkhead across it. Nindemann seems strong enough for everything, but this kind of work tells on Sweetman, and I have once or twice feared that he would break down. Whiskey is served out to them once every four hours, and a generous supply of food and coffee is made for such other men as have night work, and I thus try to keep everybody up to his strength. Chipp and myself take twelve hours' watch, each, looking out generally for work, and watching the ice carefully for emergencies. This is like living over a powder magazine with a train laid ready for firing. Melville, when he does go below, instead of sleeping, lies awake planning some new means of pumping a ship by steam, which will be more economical than the main boilers. Danenhower is, of course, out of the case altogether.

January 22d, Thursday. — As the water was becoming low enough in the fore peak to work to advantage, commenced cutting and fitting planking for the erection of water-tight bulkhead across the fore peak twenty inches forward of the foremost side of the foremast, at the step. We also cut holes in the ceiling above the berth deck on each side, and shoved down between the frames as much ashes and picked felt as the spaces would hold. These things filled up all spaces down to the filling between the cant frames, say two

feet from the keelson, and towards the close of the day they seemed to have the effect of diminishing the leak. We had to keep the auxiliary steam-pump, in the old galley-room, going all the time, however, and in the afternoon discovered a crack in its suction pipe. Repaired it, and at the same time Melville added two lengths to it, so as to make the end piece lie horizontally in the bilge. This seemed to add to the efficiency of the pump, and we materially reduced the water. The limber holes under the coal bunkers seemed to have become more thawed or otherwise cleared, for the accumulated water flowed aft more freely, and was pumped out by the engine-room pump running one half the time. After noon only water enough came aft to engine-room to feed the boiler. The engineer's force are having plenty of work; for in addition to tending the boiler and steam-pumps, Melville keeps them at work making forgings and other fittings for our proposed connection of the Baxter boiler to the deck bilge-pump. Edison's electro-dynamic machine comes in handy, for we have taken its shaft to fit as a counter-shaft for the pumping.

Upon digging out the fire-hole to-day, preparatory to recommencing soundings, we struck hard, solid ice at a depth of four feet, which so completely closed the fire-hole from below that we could not get a lead down. I believe now that when we sustained the severe longitudinal pressure the advancing floe slid under the floe in which the ship is imbedded (for she lifted forward two inches), and now lies under her as far aft as her mainmast. No doubt it was this advancing floe which broke the forefoot.

The depth of water in the ship to-day is as follows: —

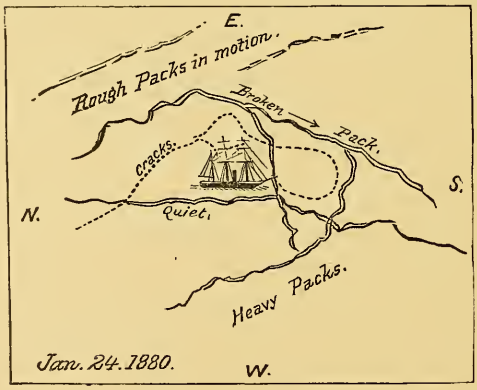
	8 A. M.	4 P. M.	Midnight.
At step of foremast .	22 in.	18¼ in.	19 in.
At auxiliary pump suction, just forward chain lockers	24 in.	21¼ in.	19 in.
At after bulkhead fore hold	26 in.	27 in.	19 in.
At fire-room bilge . .	16 in.	20 in.	19½ in.

The day opened clear excepting a bank of cumulo-stratus and stratus clouds to W. and S. W. Rising barometer from 30.05 to 30.28, and temperature falling to minus 37° at noon and rising to minus 28° at midnight. Early daylight at 7.30. High dawn. At noon rosy flush in sky to southward, showing clearly the position of the sun.

Danenhower's case has so far become worse that the doctor to-day informed me that unless an operation were performed he would in all probability lose the sight of his left eye. The circumstances of our surroundings, the poor accommodations for sick people, and the possible emergency of our having to abandon the ship and take to the floe, make the performance of the necessary operation a risky affair for Danenhower. For, should he be exposed to hardships and privations incidental to a march over the ice, he would quite probably lose the eye. Under the circumstances I advised the doctor to give Danenhower a voice in deciding for or against the operation. After some consideration Danenhower decided to have it done, and it was beautifully performed by Dr. Ambler, and borne with heroic endurance by the patient. I hardly knew which to admire the most, the skill and celerity of the surgeon, or the nerve and endurance of Danenhower.

January 23d, Friday. — A continuance of the same story : a leaky ship requiring all our endeavors to keep her free. The auxiliary steam-pump in the old galley-

room is going all the time, and the steam-pump in the engine-room about one half the time. Nindemann and Sweetman (the only two men who can be trusted not to break tools in this cold weather) stand watch and watch day and night in the fore peak building the bulkhead. By midnight all but the last upright plank is in place, and stringers and braces are being fitted abaft of it to resist pressure when the water comes against it. Early in the morning we broke out a barrel of plaster of Paris, which had been provided for the naturalist's use, and we shoved that down between the frames, hoping it would mix with the water there and harden to a cement. We also rammed down another lot of ashes and picked felt.



From Mr. Newcomb's Sketch.

The ship is wretchedly wet and uncomfortable. The berth deck is kept moist from the endless travel along it to the fore peak; the galley-room is wet, of course, from drippings from auxiliary pump; the deck-house is wet from the Baxter, and the quarter deck is covered with ice or sludge from the fire-hose discharge. The outlook is somewhat discouraging when contrasted with the ambitious beginning of the voyage. But as the darkest hour is just before the dawn, we may have a bright spot in our future.

January 25th, Sunday. — Pump, pump, pump — the same old story. As fast as we pump out, the water comes in. Nindemann and Sweetman, by hard work

together all day, finished calking the bulkhead across the fore peak. If I kept these men continuously at work, I suppose in three days I should have Sweetman on the sick list. Nindemann will overtax his great strength without admitting that he is fatigued. So as all our skilled carpenters' labor is in these two I must husband their strength as much as possible. Some would-be wise person may ask why I did not employ the whole ship's company, and why I limit the work to two men? To such a question I here reply that the work of stopping or controlling this leak effectually must be well done and by skillful hands — and space as well as other considerations permit of these two only.

At 1.30 P. M. I read divine service in the cabin. The day opened clear and pleasant, with very fine snow dust and light E. N. E. airs. From ten A. M. to three P. M. the atmosphere was remarkably clear. At twelve, from aloft was seen the upper limb of the sun much distorted by refraction.

Danenhower's case is again becoming very disquieting. The continued confinement is telling on his general health, and his failing to improve under treatment worries him greatly. Being of a very sensitive nature, he feels that he is not doing any duty for the expedition, and that worries him. We try to encourage him all we can. He accepts our kind words at their full value, but knows they do not in any way alter facts. The doctor is very anxious about him, and speaks of the stubbornness of the case and the probable necessity of another operation. My anxieties are beginning to crowd on me. A disabled and leaking ship, a seriously sick officer, and an uneasy and terrible pack, with a constantly diminishing coal pile, and at a distance of 200 miles to the nearest Siberian settlement — these are enough to think of for a lifetime.

January 26th Monday. — The beginning of this day finds us at our usual occupation: running pumps and trying to stop leaks. We continue to hold our own against the water, and that is about all. Of course our bulkhead across the fore peak presents no obstacle to the passage of water aft between the ceiling and planking, and the ashes and plaster of Paris have not got down to the bottom of the spaces between the frames. We therefore set to work to-day to rip out the ceiling above and below the bilge strake on each side. This was a hard operation, for the ceiling below the bilge strake is of teak, and had to be literally splintered out. The ceiling above was of lighter material and more easily removed. All day was required to do the work, and to stuff oakum down well alongside the keelson, and drive plugs wherever a jet of water showed itself. We had the satisfaction, however, of seeing some good results, for as we plugged up below the water came up and out above; and, therefore, if we can succeed in filling up the frame spaces there will be so much less room for water to flow through, and we may dam it up in the fore peak. Unfortunately all this takes time, and, while we are progressing slowly, our coal is burning rapidly at the rate of nearly a ton a day.

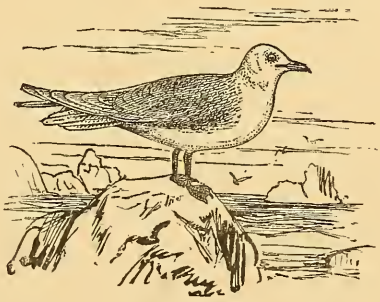
We moved the Baxter engine and boiler forward to-day, and connected it with the gearing made by Melville to the spar deck bilge-pump. It worked beautifully, doing as much work as the auxiliary pump. The event of the day, however, was the reappearance of the sun! the sun! in all his power and majesty. All hands turned out to see him and to enjoy his light while it lasted. The pleasing novelty of seeing genuine sun shadows for the first time in seventy-one days was thoroughly refreshing. Although the glare was

trying to the eyes, making me blink like an owl at first, I could not get enough of the pleasant sight.

I noticed, upon examining carefully every one who came near me, that we have a bleached appearance, which is, I suppose, natural to all Arctic voyagers, and not to be wondered at, considering our steady living by lamplight, and the difficulty of getting proper exercise in this low temperature. However, we are all healthy with one or two exceptions, and I think we may congratulate ourselves on having passed the night of the Arctic regions so successfully.

As if to give us as much light as possible on this eventful day, when the sun was on the meridian to the southward, the full moon was on the meridian at the northern horizon, so that for these twenty-four hours we had either sunlight or full moonlight all the time. We managed to find a piece of floe some little distance from the ship, which had not been underridden by a second floe, and we cut through it and sounded in thirty fathoms, muddy bottom, with no indicated drift.

Our old friend, the north side of Wrangel Land, was in sight to-day quite plainly after the sun went down, on about the same bearings as when last seen and recorded.



The Ivory Gull.

CHAPTER VII.

THE RETURN OF DAYLIGHT.

27 *January* — *March*, 1880.

The Pressure on the Ship. — Diminution of the Leak. — Lunar Halos. — Bears and Bear Meat. — Engineering Contrivances. — The Amount of Salt in Ice. — Experience of Weyprecht and Morse. — Condition of the Dogs. — Forebodings. — Observation under Difficulty. — Washington's Birthday. — Protection for the Eyes. — Cheerfulness of the Crew. — The Thermometers. — Damage to the Ship. — Trench Digging. — Soundings and Drift. — Fresh Potatoes. — An Auroral Display. — Examination of Dr. Kane's and Dr. Walker's Statements of the Presence of Salt in Ice. — St. Patrick's Day. — Ice Formation.

JANUARY 27*th, Tuesday.* — The day begins clear and pleasant, with bright starlight and moonlight, and a light air from E. by S. At one A. M. it fell calm, and almost immediately after a light air came out from W. by N. No sooner had the shift occurred, although the wind was so light as not to turn the anemometer cups, than the ice began to move. I am convinced by this time that although the ice is subject to a tidal motion, it is also quite sensitive to wind. With easterly wind we and the ice drift together, as a general thing, without risk or confusion. But let a sudden shift to the westward occur and we bring up all standing, and are beaten back with a pressure that makes us in trouble again. If, therefore, there is open water in this part of the world at this season of the year, it is to the

westward of us toward the New Siberian Islands. At two and three A. M., and two, three, five, eight, nine, and eleven P. M., the ice was in motion, grinding and groaning to the S. W. and close to us. The ship was nipped on these occasions, and cracked and snapped loudly, all the pressure seeming to come abaft the mainmast. At the last nipping I was down in the fore peak looking at the leak, and had no knowledge of the ice being in motion, no sound either of motion or pressure having reached me. Upon coming aft Mr. Newcomb met me with the information that the ice had squeezed us hard. The cabin door keeps a good record of the squeezing, for at times it takes two of us to open it, although a good bit of it has been planed away. When the pressure subsides, it does so without our being able to detect it otherwise than by the easy manner in which the door opens. The beams of the poop seem a little bowed out of shape from these repeated squeezes of the frames to which they are bolted.

Weather, as a general thing, cloudy and overcast. We did not, therefore, see the sun to-day.

At the beginning of these twenty-four hours the limbers under the coal bunkers seemed to become entirely clear, for the water came aft as pure as sea-water, and with such freedom that the auxiliary pump speedily sucked. It was, therefore, stopped, and all the work was brought on the Sewell pump in the engine-room. To our great relief this, running at the rate of fifty strokes a minute, held the water in check, and as the ready flow of water aft kept the fore peak much drier, we are able to proceed with good effect in the plastering and ramming of oakum. Although we have had to work hard and wait patiently for results, the results have come at last and give us good heart to proceed.

Melville, upon calculating the work done by this pump, showed that it was pumping out of the ship 2,250 gallons per hour, and holding the water in check. This may be taken, therefore, as the amount of the leak to-day, which, compared with the amount pumped out per hour on the 23d, 3,363 gallons, shows that we have diminished the leak over one third. We are still at work at the spaces, and cannot hope to get the work completed so as to try the Baxter combination bilge-pump before Friday or Saturday night.

January 28th, Wednesday. — The success achieved by the filling in spaces holds good to-day, for all the pumping has been done by the Sewell-pump, running fifty strokes per minute, at which rate the water is prevented from gaining on us. Water in fire-room bilge, eighteen inches at eight A. M., seventeen and one half inches at four P. M., and sixteen inches at midnight. Nindemann and Sweetman worked all day from nine A. M. to eleven P. M. in filling up spaces, etc., and they are doing a marvelous amount of work. We cut holes through the ceiling to-day above the berth deck to get spaces filled in above the water line, if possible; and we are slowly but surely advancing to the time when we can try if the Baxter can keep us dry to the great saving of our coal pile.

The ice moved at 6.15 A. M., and 6.50 P. M., in the S. W. near the ship, and caused us to experience a moderate nip. Except from the snapping and cracking of our bolts and timbers, we are not disturbed. When soundings were taken to-day, new ice to the depth of eight inches had to be cut away, the result of twenty-four hours direct freezing. The floe, through which the hole was cut originally, had a thickness of twenty-four inches direct freezing since January 19th,

for this was one of the water lanes opened in the smash up at that time.

January 29th, Thursday. — I am able to record a still further diminution of the leak. The work of filling in the spaces between frames, etc., has proceeded all day, and we now find that the Sewell pump, running forty strokes a minute, has been able to hold the water in check. The amount of water pumped out has been 1,800 gallons per hour; and comparing this with the 2,250 gallons per hour on the 27th, shows that two days' work by Nindemann and Sweetman has diminished our leak 450 gallons per hour. The work is still proceeding. In order still further to economize coal a stove was started in the deck-house to-day instead of continuing a fire in the Baxter. Heat is necessary to save the spar deck bilge-pump from freezing, but when we can save it by burning fifty pounds a day instead of one hundred pounds, we are bound to save the fifty.

January 30th, Friday. — Nindemann and Sweetman continue their slow and tedious job of stuffing plaster of Paris and ashes in the spaces between frames, etc. The water, being unable to get abaft the fillings readily, rises between the frames and the outside planking and trickles out under the berth deck at the shelf. Still we are gaining on the leak, and I hope that when we get the spaces filled up inside to a level with the water outside, and have choked up the limber holes in the cant frames (for I believe they exist), so that we have got a ready means of passage interrupted, we shall be able to keep water out of her to a reasonable extent by the use of the spar deck bilge-pump connected with the Baxter boiler.

Melville, with his never-failing readiness of resource, has commenced a piece of work by which he will run a

bilge-pump belonging to the main engine by the steam-cutter's engine and boiler, so that if he can pump out the bulk of the water forward by the Baxter rig, he can take care of what comes aft with the steam-cutter's rig. We are, of course, husbanding our fuel to the utmost, and since stopping the auxiliary pump have greatly reduced our expenditure. Sounded at noon in twenty-nine and one half fathoms, muddy bottom. A slight drift indicated to N. W. Early daylight at 6.30. Upon cutting through the ice for soundings ten inches growth in one day had to be cut away. At five P. M. a slight ice movement occurred one hundred and fifty yards to southward of the ship, causing her to experience a moderate nip. At 5.40 a meteor, in falling from S. towards S. W., showed a blue colored light. At seven, faint auroral gleams in N. At eleven and midnight, a lunar halo 6° in diameter, showing prismatic colors; and at the last named hour a faint auroral arch from E. to W. 60° in altitude to northward. Temperature fluctuating; beginning at minus 36° it goes down to minus 42°, and ends the day at minus 39°.

We are certainly having enough cold weather this month, but since the sun came back we do not mind it much. The pleasure of being out in the sunlight will make us forget the cold. But generally we have had light airs about noon since old Sol's return, and by looking out for our noses we can go about with impunity.

January 31*st*, *Saturday*. — The day opens and continues pleasant and clear, except a haze which hangs around the horizon. At one A. M. a lunar halo was observed, 6° in diameter, and showing prismatic colors. (I have remarked that these lunar halos are with us almost positive evidence of ice openings in our neighbor-

hood; the liberation of water at a temperature of 29° or 30° to the action of the air at minus 29° or minus 30° always occasions a mist, which, rising by natural laws, interposes between us and the moon and causes us to see that luminary dimly. As its distance from us increases it forms the halo. Snow dust occasions a similar phenomenon with the same peculiarity of color.) At eleven the sun was about 3° above the horizon, being much raised by refraction. At six A. M. faint auroral arches or bands shedding diffused light.

We succeeded to-day in thawing the delivery-pipe in the ship's side, so as to discharge the water through it instead of pumping it through the fire connection on deck, and that saves us from a steady fear of the hose freezing up.

February 1*st*, *Sunday.* — We ended the month of January with the steam-pump going, and we commenced the new month of February in like manner. The steam-pump is kept going all day, and although it is the only one working manages to hold the water in check, going forty strokes a minute, equivalent to pumping out of the ship 2,250 gallons an hour.

At midnight, ending this day, Nindemann and Sweetman had managed to clear the limbers completely on one side of the ship chock aft to the fire-room, and in consequence the water flows aft as freely as it enters. At one P. M. the Articles of War were read and the men mustered, after which I inspected the ship. Of course, everything forward was damp and disagreeable, but we can hope for no better luck with two thousand two hundred and fifty gallons coming into her per hour. At 1.30 I read divine service in the cabin. At eleven A. M. an Arctic fox (white) was seen close to the ship. The dogs went for it, and the poor thing ran for the

gang-plank, as if to come on board for protection. Alexey, however, met it with his rifle and killed it. In its stomach were found some lemmings' tails and nothing else. Immediately thereafter a bear appeared, and Chipp succeeded in killing it, and to my great satisfaction we have again fresh meat hanging in the rigging. The bear weighs about four hundred pounds, and its stomach is absolutely empty. I hail with great satisfaction this evidence of animal life, for it will enable me to make a very acceptable change from our canned meat diet. In connection with this subject, I may as well remark here that beyond a doubt canned fresh meat is far superior to salt provisions. But it requires a greater amount to satisfy hunger, and one soon becomes weary of it because of its tastelessness. All canned meat seems to taste alike. Such a thing as canned turkey and canned chicken is a delusion and a snare. There is such a hopeless confusion of smashed bones and small pieces of meat that we have unanimously called the resulting dish a "railroad accident."

At nine P. M. a meteor was observed falling from N. E. to E. At ten the ice commenced to grind and move, the general direction of the movement being from S. to N. At midnight the sky became suddenly completely overcast, and while I was concluding that this sudden darkness was due to ice openings presenting warmer water to cold air, my conclusions were verified by the ship receiving some severe nips. A careful examination of the surrounding ice showed no sign of disturbance, nor was there a sound of movement anywhere. But I am satisfied that there was an ice opening somewhere near the ship.

February 2d, Monday. — Upon calling me this morn-

ing, the steward informed me that another bear had been killed, "and that he had tried to get in the deck-house." Supposing that we had become careless in lookout, or the bears had made an invasion, I turned out and inquired. The facts were that a bear had come near the ship at seven A. M., his presence being denoted by the dogs retreating on board in a body and manning the rail, barking at his bearship. While the quarter-master was summoning Chipp, the bear, attracted by the meat of his brother already hung up to a girtline, attempted to climb up the ship's side to get on top of the deck-house, but fell back. Seeing the gangway board, and recognizing its use no doubt, he was about to march up it, when Mr. Dunbar appeared at the rail and fired at him. The bear, wounded only, made off, and the dogs followed him. He sat down to keep the dogs at bay with his fore paws, bleeding very freely, and in that position Mr. Dunbar dispatched him. He was eight feet one inch long and weighed nine hundred pounds, forming a welcome addition and change to our larder. His stomach contained several small stones resembling pieces of slate, and nothing else. Alexey while out this morning saw a walrus, and brought back a shell which he had heaved up. For a wonder Alexey was without his gun, or else we might have laid in a supply of dog food. Our fish, except forty days' rations packed on the sleds, is all gone, being finished to-day, and we must now commence on our prepared dog food of meat and bones supplied by Mr. Newman at St. Michael's. We find considerable breaks in the ice near the ship this morning, accounting for the sudden cloudiness and haze at midnight last night.

Melville keeps on making the combination of the steam-cutter's engine and boiler to the bilge-pump of

the main engine. He tried the combination to-day, using steam from the main boiler, and found that the engine had to run so fast to develop the necessary power to work the pump without the engine catching on the centre that the pump was driven too fast to lift any water. Hence he has to make a gearing to regulate the work of the pump, and, energetic as he is, to see an improvement is to commence to make it. At one P. M. the ice began to move, and from that time until eight P. M. we were getting nips and pressures at a few moments' interval. We are so accustomed to these alarms now that we take them quietly, thankful when they end, and knowing we are helpless pending their duration.

February 4th, Wednesday. — The Sewell pump is kept going all day as usual, but we find that by running it thirty-five strokes a minute we hold the water in check; that is, keep it at a uniform depth of sixteen inches in the fire-room. We have reduced the amount of leak 282 gallons an hour within the last few days, and 1,695 gallons an hour since the first occurrence. Were it not for the expenditure of fuel we should be doing first rate; but when we burn 1,200 pounds of coal a day, and have only eighty-five tons left to-day, it is not only a matter of simple calculation to find out how long it will last, but it seems to make our staying out another winter a matter of considerable doubt. We are driving ahead, trying to hurry up the steam-cutter arrangement, hoping, while the Baxter pumps forward, the cutter-engine will pump out aft, and let us do away with fires under the main boiler. This will reduce our coal expenditure fifty per cent. Nindemann and Sweetman have about finished the filling in business, watching their work now to ram in more ashes as fast as old fillings settle.

The surgeon hands me in the report of his monthly examination. The men are generally in good condition, and there is some falling off among the officers in weight. Danenhower's case is pronounced a very critical one, it being a matter of certainty almost that he will lose the sight of his left eye. The condition of the officers is classed thus: excellent, one; good, five; fair, one; poor, one. Of the twenty-three men, excellent, eighteen; good, five; and the natives are in excellent health. We commenced to get our provisions in some kind of order on the quarter deck and in the deck-house. When the leak occurred, everything was hurriedly broken out of the hold and store-rooms forward and placed anywhere.

February 5th, Thursday. — The Sewell pump is kept going all day at the rate of thirty-five strokes a minute, holding the water in check with that work; sixteen inches of water stand in the fire-room bilge all day. Lest any one should read this journal without my being on hand to explain the question, Why is not the sixteen inches pumped out at once, and the ship kept dry at the rate of thirty-five strokes of the pump per minute? it may as well be answered here: The ship is heeled 3° to starboard, and naturally the greatest accumulation of water takes place on that side. But the suction of the Sewell pump is on the port side of the keelson, and the only communication from one bilge to the other is by a small hole about large enough for a piece of eighteen thread ratline stuff to reeve through. We tried to bore larger holes, but the keelson is so full of bolts and fastenings as to stop us. Hence the water must be allowed to rise until it will flow over the keelson to port, in order to take it out by the Sewell pump.

Melville keeps driving ahead at his combination of

the steam-cutter's engine with the bilge-pump of the main engine. Everything now is waiting for that. It is possible that I might pump all the water out by the power of the Baxter engine connection with the forward spar-deck bilge-pump (or, at all events, keep a good control over the leak), were it not that some water would come aft to the water-tight bulkhead. If this is not pumped out it will at once freeze, unless a fire is kept going to heat up the engine-room while it is pumped out by hand. Pumping by hand will use up my crew, and should we be obliged to leave the ship in a sudden smash-up, I would have an exhausted body of men to lead over the ice two hundred miles to a settlement. If the water freezes in the ship, more damage may be done in a day than we could repair in a month. To keep up fire enough to prevent its freezing while we pumped by hand, would use up as much coal as is now required for the main boiler. Hence the wisdom of burning that amount of coal in the manner which will save exhausting the men. If the steam-cutter's engine will do the work with the Baxter boiler forward doing its share, we shall save one half our fuel, or in other words, make it last twice as long.

From nine A. M. until three P. M. the north side of Wrangel Land was in sight. Measuring with the sextant from the sun at noon we get the following bearings: Most eastern visible extremity of land S. 13° W., most western visible extremity S. 21° W., direction of ship's head S. 49° W. It is quite evident to me that but a portion of the land was seen this time, for upon other occasions it covered a much greater angle, and our change of position, in the mean time, has been toward it instead of away from it. Early dawn at six. At eleven the ice was in motion to the S. E.

February 6th, Friday. — The rig whereby the steam-cutter's engine it is hoped will work the bilge-pump attached to main engine being finished, trial is had of it to-day, getting steam from the main boiler. I am sorry to say the trial is unsatisfactory. The engine is not powerful enough to do the work which the pump is prepared for. A description of the apparatus may well come in here. On the shaft of the steam-cutter's engine is secured a wooden pulley six inches in diameter. Above it is secured a frame and shaft to the hanging coal bunker, and on the shaft is placed another wooden pulley eighteen inches in diameter. Around the two pulleys is an endless belt. On the end of the upper shaft is a crank, which, by a connecting rod, works a break attached to the bilge-pump. Theoretically it ought to work, but practically it does not, for this reason: The discharge pipe of the pump is long, and has many angles before it reaches the ship's side. The pump being a force-pump of six inches stroke, and the engine being four and a half by six inches, were the delivery at the pump, it would be an easy matter; but as the delivery has to be made through a sinuous pipe one and a half inches in diameter, the water chokes in the pipe in such a way as to make the little engine struggle and labor, and occasionally come to a stand. Greater steam pressure would force the water no doubt, but the little engine would not stand the racket. While Melville was trying in every way to solve the difficulty, it was discovered that the delivery in the ship's side was frozen, and while we were thawing it out the day ended. Should no better result occur, Melville will go to work to make the pump smaller by inserting two small plungers and filling it with Babbitt's metal. The day opens and continues fine. Temperature increases

from minus 32° to minus 23°, and falls again to minus 26°. Eight inches of ice formed over sounding hole since yesterday. Upon attempting to measure the present thickness of the floe, which, on the 4th, was five feet four inches thick, it was found that another floe had shoved in under it. I am inclined to think that has been the case all around us, and that perhaps our controlling the leak has been due to the underlying floes of ice uniting by freezing and lowering the water head in the vicinity of the leak. If that be the case, we shall have our hands full again at a breaking up.

February 7th, Saturday. — I remarked in yesterday's journal that we discovered the pipe of the main engine bilge-pump frozen solid, and that while we were thawing it the day closed. At the same time the crank was shortened so as to diminish the stroke of the steam-cutter's engine. Everything being in readiness we gave the rig another trial, but it would not work satisfactorily. True, it did pump water, but with such jerky and labored efforts on the part of the engine that we could readily see it was being overtaxed. The pump was too large for the engine. The rig was therefore discontinued, while Melville put his people at work to boush the pump with Babbitt's metal, and insert a smaller plunger, converting a single-acting piston-pump of six inches diameter into a single-acting plunger-pump of three inches diameter. This will take a couple of days, and in the mean time steam must be kept on the main boiler. At the end of the day I am thinking of trying the Baxter pump alone.

At nine the sun was raised a full diameter above the horizon by refraction. Extraordinary mirage from nine until afternoon. Extremely variable winds, at times shifting sixteen points at once. Mirage affected by

shifts of wind. Wrangel Land sighted S. by W. At two it was much raised by refraction and inverted by mirage.

February 8th, Sunday. — Upon inspecting the ship at noon to-day I found the temperature in the deck-house to be 18°, and lest our bilge-pumps should freeze beyond our control, I ordered a fire to be lighted under the Baxter boiler. As it will be several days before the work is finished which Melville has on hand, I thought this would be a good chance to see whether we could control the leak by the Baxter and the bilge-pump alone. Accordingly when steam was ready in the Baxter we closed, or rather attempted to close, the gates in the water-tight bulkhead. The port gate went down all right, but the starboard one seemed to be out of gear, for we could not get it down all the way, nor open it wide. To get at the gates, access must be had to a little space between the after bulkhead of the forehold and the forward side of the coal bunker. We commenced to break out the provisions and other stores with which this space is filled. The work of pumping the water, up to three P. M., had been done by running the Sewell pump thirty-five strokes per minute. When the Baxter commenced to run, the Sewell was put in operation only fifteen minutes in every hour. But it must be borne in mind that the bilge-pump suction is six inches from the bottom, and that the water has to flow over the keelson in the fire-room before the pump can take it. Our experiment has come to nothing, because, owing to leaky gate, water will flow aft into fire-room, and a pump must be kept going there.

I found the ship in as orderly a condition as could be expected under the circumstances. Everything being broken out from below forward, had to be piled up in

the deck-house and on the quarter deck. The berth deck was damp, considerable moisture standing on the beams overhead. Until this injury to the ship the crew always had the deck-house to go to for a change, but now most of the time has to be passed on the berth deck because the deck-house is full. With a temperature ranging between minus 40° and minus 47° they cannot be sent out for very long from the ship, and as there is no open water we have no seals to occupy our attention. Read divine service in the cabin.

We are being favored with beautiful weather. It is so long since we have had a strong wind that I cannot remember when we had our last. The sun shows up brightly day after day, the daylight grows longer steadily, lasting now from seven A. M. to five P. M., the nights are bright with starlight, the ice seems quiet, and were it not for cold snaps that keep us shut up, we should get over many a mile of ice in exercise, in celebration of our farewell to our Arctic night. Chipp and myself still stand our twelve-hour watches; he from four A. M. to four P. M., and I from four P. M. to four A. M. This is rather wearing, for it obliges me to turn part of our day into night in order to get enough sleep, but as Danenhower is still *hors de combat*, there is no one to make share it — unless I include Dunbar, and I do not do so, because, in the critical condition of things I am of opinion that some one should be around at all times with full authority to act promptly and decidedly, and the fewer people have that authority the better.

The day began and continues clear and pleasant, but with considerable haze around the horizon. Winds beginning at N. W. back to W. Barometer begins 29.93 and rises to 30.04; the temperature begins minus 42°, and by nine A. M. reaches minus 49.5°, when mercurial

thermometers decline to work longer and the mercury freezes solid; spirit thermometer No. 4,402, at that time reads minus 47° and goes down 2° more before end of day. As the spirit thermometers are not reliable it is safe to assert that it has been to-day below minus 50°.

An alarming amount of carbonic acid gas, 5.304 volumes per thousand, or .5304 per cent., was found on the berth deck at eleven P. M. Seeking for a cause I found that in the press of things requiring our attention of late, the iron ventilating pipe over the berth deck skylight had not been kept clear of ice, being in fact chock full of a solid mass, and effectually preventing the exit of foul air or the entrance of fresh air. Had it cleared.

February 9th, Monday. — There is very little to record to-day in the form of a change. Resuming work early this morning we broke out all the provisions and other stores contained in the little store-room, between fore hold and coal bunkers, in order to get at the flood-gates. We found that the port gate was tightly closed, and that no water flowed through on that side. On the starboard side, however, the case was different. Owing to an accumulation of rust and dirt, the long rod from the spar deck extending to the end of the screw thread on the spindle working the gate failed to bite the screw thread, so that turn the rod as we might it would neither close nor open the gate. Clearing away the dirt and rust we finally got the gate shut, but found that enough water leaked through into the engine-room to require the Sewell pump to be kept running fifteen minutes every hour. However we are holding our own. This experiment had to be tried before we attempted to rely on the steam-cutter engine doing the work which might escape from the Baxter

pump. We are satisfied that it can, and now we must see if our gate can be made so tight as to make the Baxter engine do all the work. To get at the gate we have to rip up a heavy flooring and that takes time.

February 10th, Tuesday. — Upon getting down to the gates in the water-tight bulkhead we found that the starboard one was neither broken nor sprung, both seeming perfectly tight, that is, no leak was apparent through them. There must, therefore, be some leak through between the frames and the planking to account for the water finding its way abaft this bulkhead, but as it is impossible for us to get at its exact locality, we can as yet see no way of remedying it. By running the Sewell pump sometimes five and sometimes ten minutes every hour, we hold the water in check in the fire-room bilge; while as fast as the water banks up forward of the water-tight bulkhead it is pumped out by the bilge-pump run by the Baxter engine. This is, however, kept running nearly all the time.

February 12th, Thursday. — Although unable to find any leak through the water-tight bulkhead, the carpenters (Nindemann and Sweetman) have been employed, touching and filling up all doubtful places. By the stupidity of one of the firemen (Boyd) we were able this morning to decide that the leak does not occur in the bulkhead itself or through the gates. In order to keep the Baxter boiler from choking up with salt it is our habit to blow it out once in twelve hours. Before blowing out the fires are hauled, and new ones built when required. Boyd attempted to blow out without ascertaining whether the out-board delivery pipe was clear or frozen. As a consequence, the pipe being frozen, so much time was lost before the pump could be started again, that thirty inches water had accumulated for-

ward of the water-tight bulkhead, and then Nindemann heard a noise of water falling like an overflow, while he was abaft the bulkhead. Upon examining, and listening attentively, it was located, as exactly as could be under the circumstances, as coming from between the planking and frames outside of the bulkhead and abaft of it. As a necessary sequence the water rose much higher in the fire-room bilge. As soon as the Baxter boiler could be got to work again the water was speedily reduced to twenty-two inches, when the overflow ceased, and only the usual small amount, that is, one half inch per hour of water, found its way aft into the fire-room. The steam-cutter's boiler being in readiness, steam was got on it to run the steam-cutter's engine in connection with the converted bilge-pump of the main engine. The combination worked well, pumping out dry the engine-room bilge. It was found, however, that the furnace of the cutter's boiler was too small to keep up a continuous pumping, the steam running down too low whenever the fire was cleaned or the boiler was being pumped and blown. As we want to be sure that this little boiler will do all that is expected of it, and shall be in its most efficient state, ready to answer any sudden demand, Melville proposes to cut down its bridge wall, take out its nine-inch grate bar, and insert one sixteen inches long, thus increasing its grate surface from 144 square inches to 256 square inches. This is immediately commenced, and to-morrow I hope it will be done, and we shall be able to dispense with the main boiler altogether.

A bear came near the ship at seven A. M., but being frightened by the dogs made his escape before any one could get a shot at him.

February 13th, Friday. — Completed the work of re-

moving the bridge wall of steam-cutter's furnace and placing in the furnace sixteen-inch grate bars instead of nine-inch ones. Got steam on the cutter boiler again, and found upon lengthened trial that the alteration before mentioned made it possible to work the rig continuously to main engine bilge-pump, and thus keep the bilge nearly dry. Hauled the fires under the main boiler, ran all the water from it, and drained out all engine and boiler-pipes to prevent their freezing, and pumped the bilge dry with the steam-cutter's rig.

At last we have succeeded in reducing our fearful expenditure of fuel to a reasonable amount; 400 pounds of coal a day will now run our two steam-pumps, and that is much more comforting than burning 1,000 or 1,200 in the main boiler furnaces. Enough water accumulates forward of the water-tight bulkhead to require the steady running of the Baxter rig, and enough gets aft through "between frames" to occupy the steam-cutter's rig continuously. The crew were kept busy all day in trimming down the coal in the after bunkers so as to get a place ready for receiving some of our provisions. With the spar deck and deck-house all lumbered up, we should be in a fearful mess if the ice were to heave us around, and I have concluded to make use of empty coal bunkers as provision rooms. While water is coming into the ship forward we cannot restow in the fore hold or flour-room anything that would be injured by dampness, even if prudence did not dictate keeping those places clear in the event of any fresh mishap. Water continues to mount up between the frames and planking forward of our bulkhead in the fore peak, and trickles out along the berth deck, keeping everything damp and nasty. Nindemann and Sweetman keep at work trying to stop this by putting in fresh fillings where old ones have settled.

Referring to my remarks on December 14th, in relation to Weyprecht saying, "Beginning at a certain thickness the ice is almost free from salt," it may be as well to state here the result of our examination of the ice in which we are drifting. A piece of floe ice, formed from direct freezing, and three feet nine inches thick, was selected for examination. The following are Dr. Ambler's figures for the result of his test (Parke's test). (See Appendix E.)

Number of grains of salt per gallon of sea-water equal	2045.
Number of grains of salt in cube cut from upper five inches of our block	548.06
Number of grains of salt in cube, cut from lower five inches of our block	347.25
Number of grains of salt permissible in potable water	10.

From which it will be seen that the "certain" thickness has not been attainable by us, for we cannot find a single piece of floe from which we can get potable water, and since it seems never to snow up here we have to distill every drop of water we drink. If, as Weyprecht says, the salt is all crystallized out during the winter and washed off during the summer, the upper layers of old ice remaining ought to be fresh; but in our experience they were as salt in September last as the new floes are salt now. We may be having phenomenal ice, but I hardly think so. If all, or nearly all, the salt resulting from the freezing of sea-water comes to the surface as efflorescence, and is washed off into the sea during the following summer; and if the exposed upper ice then melts by the action of the sun's rays and is in its turn frozen in the fall, squeezing out again a small residuum of salt, I can understand that

the refrozen ice may be purer than the ice newly made. But that it contains less than ten grains of salt to the gallon I am not so ready to admit. In face of Weyprecht's assertion, I do not intend to urge that he was guided by taste rather than chemical test. I will simply remark that we have not been able to find ice, old or new, surface or subaqueous, that would be water proper for men to use continually. Dr. Morse, of the Nares Expedition, says, in his testimony before the Court of Inquiry, that he tested the water obtained from the melting of ice on the top of a floeberg and found it pure. The inference is that he tested it analytically. But I have had an idea for some time that the outbreak of scurvy on board the English ships may have been due to the continuous use of water which, though pure enough to the taste, was unfit for consumption. For instance, I find that our washing water, which is obtained by scraping such floes as have retained or accumulated a little snow, is not objectionable to the taste, but yet it contains 28.63 grains of salt to the gallon, and would be highly injurious if used steadily. Since the occurrence of the leak, and the use of the Baxter boiler to run a bilge-pump, our distilled water has been made by the main boiler. As this was shallow some salt was carried over from it to the distiller, and the resulting water showed 13.49 grains of salt per gallon. This, of course, was too much, but we have been in an emergency where purer water was not possible. Now that we have hauled the fires under the main boiler, the distilling has to be done by the steam-cutter's boiler when it is not pumping the bilge out. As this boiler is fed from the bilge, the drinking water is made from the water leaking into the ship. Until we began to drink it we were under the impression that it,

the boiler feed, must be pure salt water, for so much water has flowed into the ship and been pumped out that our bilges are as clean as a whistle. But upon tasting and testing it we find it has an unpleasant taste and odor. With sea cocks frozen solid in their seats, getting a supply from the sea was no easy matter; and a thawed valve soon froze hard again with an outside temperature of minus 35° to minus 40°. However, Melville managed to get a Kingston valve open, so that we can feed our little boiler from pure salt water and not bilge water, and now I do not anticipate any difficulty. One of my ideas that fresh water, that is, fresh enough water, could always be obtained in the Arctic regions, has been thoroughly exploded.

February 14th, Saturday. — The forward spar deck bilge-pump is kept running all day. The steam-cutter's engine, running in connection with the main engine bilge-pump, is used about one sixth of the time to pump out the fire-room bilge, and the remainder of the time it is used for distilling water for drinking and cooking purposes.

February 15th, Sunday. — Although we have succeeded in getting our pumping so perfected that we can hold the water in check without resorting to pumps worked by the main boiler, our troubles are not ended yet. The water has succeeded in forcing its way up on the berth deck on the port side, driving through the filling between the frames. As a consequence, the berth deck this morning was wet and sloppy, and uncomfortable beyond expression. Sweetman indefatigably set to work again to put in more filling, and at the same time build a little bulkhead under the berths to keep the water from flowing out over everything, while a hole bored in the deck itself will let it off into the

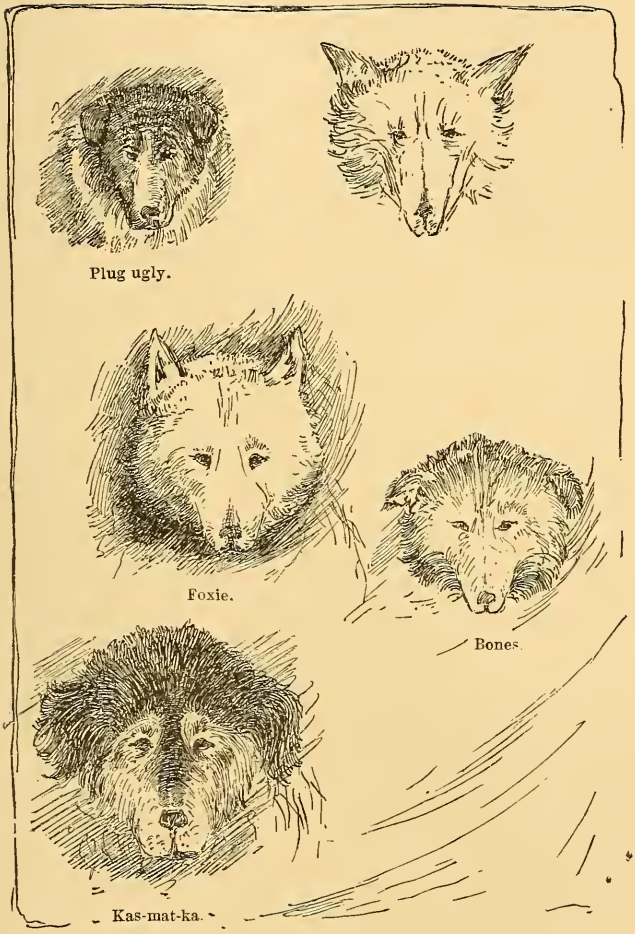
fore peak. This, at all events, is what he is undertaking; but if not immediately successful, I shall bore through the ceiling below and let the water come out into the fore peak directly. Men cannot keep their health in the wet and damp now on our berth deck. The drip from condensation is also very bad, the two forward and two after berths requiring rubber blankets suspended over them to save the bedding from getting wet. Verily, all our troubles are coming upon us at once.

Usual Sunday inspection at one, and divine service at 1.30. The ice began to get uneasy, giving us several severe shocks before midnight.

February 16th, Monday. — Since getting the sea-water through the Kingston to the steam-cutter's boiler, instead of feeding it directly from the bilge, we have no trouble about our distilled water. As the boiler has a little steam-drum on top of it, no salt is carried over from it to the coils, and we are now enjoying almost chemically pure water. We are not expending fuel for this purpose alone, however, because steam is necessarily kept all the time on this boiler to keep the fire-room dry.

Between midnight and four P. M. we received several severe shocks from ice pressure. When the walking parties went out at noon they discovered, about half a mile to the northward of the ship, a long lane of water. Sweetman was partially successful in stopping the weeping of the water along the berth deck.

February 17th, Tuesday. — Our poor dogs suffer the most in all this trouble in getting the pumps to work with but a small consumption of fuel. While we had steam on the main boiler, we were able to steam the concentrated dog food received at St. Michael's, and



SOME OF THE DOGS.

from sketches
by Mr. Newcomb.

thus make it eatable. But since the fires under the main boiler have been discontinued the dogs have had a hard time. I learned to-day that they were being fed on this concentrated food in its present frozen condition. I have been wondering for several days why the dogs fawned so much upon anybody who came on deck, and why the rattle of an empty meat-can thrown over the rail was a call to all the dogs to rush for the ship in a body. Being up all night, and getting my rest in the daytime, I lose track of some details by my not seeing them, or Chipp forgetting to report them. As soon as I learned of the issue of frozen dog food, I immediately conferred with Melville about putting a pipe in the Baxter boiler to carry steam into a barrelful of the dog food to thaw it, and he commenced to do so immediately.

Some of our dogs have poor teeth, and some seem to be going it "on their gums." These, while trying to get the frozen morsels down, are frequently robbed by the more vigorous dogs who have good jaws, and who can if necessary reduce an iron bar to proper size for their stomachs. Being unable to get sleep this morning, after my all-night watch, I went out on the floe at nine A. M., and was immediately surrounded by all the toothless dogs, who fawned upon me as if their instinct had told them I was the commanding officer, and should be appealed to to right them. I am in hopes now that the evil is remedied, and that every dog will get his food in such shape as will prove eatable.

Sounded at noon in thirty-one fathoms (muddy bottom), a northwest drift being indicated by the lead line. Ice formed seven inches in thickness over sounding hole since yesterday. We have been favored with a gale to-day with tremendously heavy squalls.

The water being pumped out of the ship of course freezes at once, and in consequence the ice on the starboard side reaches above her doubling. This naturally will hold the ship down, but we cannot help it. Working in this temperature is difficult for men, but impossible for tools. When the temperature becomes decent, say at zero, I shall have a trench dug around her to relieve this hold, but at present nothing can be done. Finding that the delivery of the hose was constantly freezing, we allowed the surface ice to cover above the scupper, and then dug a hole down underneath for the water to flow, raising the temperature of the delivery to that of the surrounding ice.

February 18th, Wednesday. — A very stormy, disagreeable day, — one of the worst we have had. The day began with an E. N. E. wind, with a velocity of fifteen and one half miles an hour. This backed and moderated until it reached N. at six A. M. (velocity six miles), the barometer then standing 28.59, — our lowest on record. There it remained until the wind backed to N. W. at seven, when it commenced to rise. Remembering that "the first rise after very low indicates a stronger blow," I stood by for a breeze. It commenced to freshen immediately; at frequent intervals we had very heavy squalls, probably from thirty to forty miles velocity. Snow filled the air in falling, and when drifted by the wind. The temperature fell rapidly to minus 34°, and with the fierce wind and driving snow hiding everything at twenty yards, while sifting through one's clothes, made up one of the most disagreeable days we have yet seen. Barometer reaches 29.11 by midnight.

Finding that staying up all night until 4.30 or 5.30, and struggling to get enough sleep in the day (without

reference to the extreme irregularity of my eating), was telling on me to a considerable extent, I arranged the night work in three watches, taking until midnight myself, putting Mr. Dunbar on for the midwatch, and having Chipp look out after four A. M., until some emergency arises, or I find myself equal to another spell.

Danenhower's sickness throws the work out greatly. With our small number, one less affects us seriously. His case is becoming more aggravated instead of improving. Despite all operations, it seems to be a foregone conclusion that he will lose his left eye. His case will not yield to treatment, but continues to work itself along in thorough fashion in its own regular way.

February 19th, Thursday. — Pump, pump, pump! the same story day after day, and steadily our coal supply diminishes. An average expenditure of five hundred pounds per day, or perhaps five hundred and fifty would be nearer the mark, is required to keep us warm, cook our food, and pump the ship out. A very simple calculation will determine how long we can go on at that rate. All our hoped for explorations, and perhaps discoveries this coming summer, seem slipping away from us, and we seem to have nothing ahead of us but taking a leaking ship to the United States. At the best, I do not like to contemplate any further accident, although in our position almost anything might befall us. Writing down one's sensations here is of no use. They will always be fresh enough to my mind without doubt, and a record of them would be to no purpose. Putting down things as they occur will be much the better plan. A very stormy, disagreeable day.

February 20th, Friday. — We have been carefully observing the working of both our pumps, and calculate

the performance of each in order to get as exact an idea as possible of the extent of the leak. We find the amount of the leak may be assumed to be 1647.7 gallons per hour. Sounded at noon in thirty-two fathoms, muddy bottom with shells. A small clam was brought up by the lead. A drift to N. was indicated by the line. Five inches of ice formed over sounding hole since yesterday. Clear and pleasant weather, moderate west winds. Temperature slowly falls from minus 45° to minus 46°, but I am inclined to think it is colder than is recorded. Our mercurial thermometers record below minus 40° (the freezing point of mercury being minus 39°). But how far such records are reliable is a matter for scientific consideration. One of our mercurial thermometers records minus 50°, and our spirit thermometers are generally from 3° to 4° higher (warmer). Beyond minus 39° by mercurial thermometers I consider our most careful records as unreliable.

Although we have a clear day and a clear horizon, no land is to be seen. We must therefore have drifted away from our N. side of Wrangel Land. With the high winds prevailing of late we have had no chance of getting observations, and with the cold weather we are having, one is sure of frozen fingers. In the absence of a place to erect our observatory, all our astronomical observations have to be made with sextant and artificial horizon. Care has to be taken to get the sight quickly before the mercury freezes, and as the fingers are like sticks, they do not work tangent screws readily. While working at these the horizon and index glasses frost up, and then there is nothing to do but come in and thaw out. Under ordinary circumstances our transit theodolite might be used. But apart from the difficulty of working leveling screws in this tem-

perature, the theodolite would have to be brought in-board to be read, and the transportation would perhaps alter the reading. We get along fairly well, however, all things considered, Chipp filling Danenhower's place in taking sights.

Vapor arising from the ice to the S. W. during the afternoon, indicating water hole.

February 22d, Sunday. — At eleven A. M. I inspected the ship. The result was not encouraging, so far as the future health and comfort of the men are concerned; everything in the deck-house and berth deck was either very damp or dripping wet. The heat from the Baxter boiler warms up the deck in its immediate vicinity and thaws the ice, making wet and slop; and the heat ascending to the roof melts the frost on the beams, causing them to drip steadily. Add these two things to the unavoidable drip of leaking steam from cocks, etc., of the Baxter boiler, and we have a condition of wet and damp that is disagreeable in the extreme. So much for the port side. On the starboard side the pump discharges through a canvas hose to a scupper hole, and the leakage is considerable. The stove on the starboard side keeps the frost overhead and on the side in a constant state of drip without ever drying it. These two things keep the starboard side of the deck as wet as the port side. To reach the berth deck everybody has to pass through the deck-house on the port side, and as a consequence wet and slop are carried below on everybody's feet and into the berth deck. This begins the trouble there. Then the steady flow of water into the ship under the berth deck and aft to the pumps helps to retain the dampness where deposited, and if anything is needed to complete the discomfort the drip from the beams comes in as a finish. The stove keeps

the midship berths dry and comfortable, but the forward and after berths require rubber blankets over them to catch the moisture. Since the leak we have not been able to air the bedding in the deck-house, because it would only absorb dampness; and we have to rest content with turning up all the mattresses in the berths every morning, and letting the air already on the berth deck circulate around them. Although the Baxter boiler and stove keep the deck-house warm, six of each could not keep it dry, and it is this continued dampness that I fear will eventually tell on the men. The worst of it is that we can hope for no improvement until we get moderate weather. When that time comes, I intend moving the Baxter engine rig to the after bilge-pump, and letting all the water come aft freely through the gates in the water-tight bulkhead. But I cannot do this now because the after bilge-pump stands out on the deck, with nothing more than the tent-awning to shelter it, and would undoubtedly freeze and choke up with ice while being worked.

Although the weather is terribly cold, everybody is encouraged to take exercise out on the ice. From eleven to one every day the berth deck is cleared and aired, and the men of their own accord take at once to the ice, tramping up and down near the ship, or wandering off looking for open water and seals or bear tracks. The officers are as ready to take a constitutional walk as could be desired, the cabin being thoroughly aired. We are as comfortable aft as we could wish. The ward-room is and has been perfectly dry, not a sign of drip or dampness being visible. As there never is any fire there (except Saturday night to heat water for bathing) the temperature ranges between 28° and 32°, and the officers below find that by no means

uncomfortable for sleeping. The forward bulkhead of Chipp's room and my room is constantly covered with ice, which, when the rooms get warm, thaws and drips on the deck, but as it is either wiped up or freezes again we suffer no discomfort. Our beds, being in the after part of the rooms and in-board, are perfectly dry. Such moisture as condenses on the ceiling runs down the curve of the turtle-back, lodges on the bulwark book-shelf, and is occasionally chopped out with a hatchet. But these are trifles, and I am as comfortable as possible. With good health, good appetite, and now enough sleep, I feel as if I could endure these small privations for an indefinitely long period of time. But I am considerably worried about the damp condition of the men's quarters. I see no bad effect yet upon their health, and as they are bright and cheerful, the discomfort does not affect their spirits; but I know the conditions are unfavorable to proper health, and I am anxious as to the result. We can hardly look for mild weather until April, and that is five weeks off yet.

It is pleasant to record one favorable thing, and that is, a reduction in the coal expenditure of fifty per cent. as compared with last week. Our expenditure last week was 1,021⅘ pounds, and this week is 564⅘. At one P. M. read divine service in the cabin.

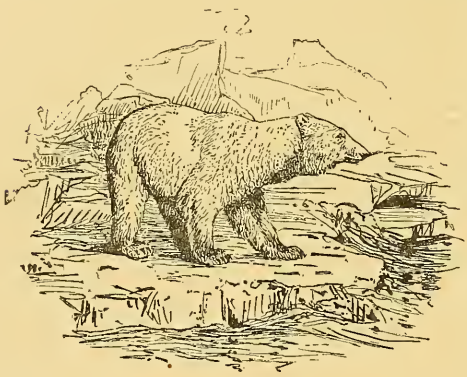
February 23d, Monday. — Washington's birthday having fallen on Sunday this year, the celebration of it was deferred until to-day. At sunrise we dressed ship with American ensigns at the mast-heads and flag-staff, and the Union Jack forward. There is no fear of contradiction when I say that this was the first time Washington's birthday was celebrated in this part of the world. Beyond flag-hoisting we made no pretense of keeping holiday. There is so much absolutely neces-

sary work to be performed daily, now that we are leaking, that there can be holiday for nobody.

Sounded at noon in thirty-three fathoms, mud and gravel. Ice five inches thick formed over sounding hole since yesterday. Early daylight at 4.50 A. M. An opening in the ice about one half mile to the southward of the ship. Full moon occurs at noon on the 25th, and we must stand by for a scare I suppose.

A bear came near the ship at midnight, but the dogs made a rush for him and drove him off before anybody could get a shot at him.

February 24th, Tuesday. — A slight shock from the ice at 3.50 A. M. and a sound of ice in motion was heard at the same time. At four this afternoon we sighted Herald Island from aloft. This seemed almost like meeting an old friend. It bore S., verifying our sights for position on the 21st. Bright, pleasant weather. So powerful have the sun's rays become that I have ordered the wearing of snow spectacles by everybody going away from the ship. At one A. M. brilliant aurora.



A Polar Bear.

At ten this morning there was a great going on with the ice. The usual grinding and screaming broke out suddenly all around us, but at some little distance, say a quarter of a mile. No ice could be seen moving, but that there was motion somewhere was evident from the vapor that rose from openings in the floes. A very

curious phenomenon in connection with this was that puffs of vapor would shoot up like smoke from an explosion, too distant to be heard, and follow along in a line of possible fracture. As soon as the puff had disappeared a regular haze would rise as if from open water. The commotion went on until eleven A. M., when it ceased as suddenly as it began. We did not experience any shock or jar, and as our period of suspense and standing by was a short one, we were not inclined to regard the movement as any "great shakes." I had been looking forward to this time, the time of full moon, as a period of uncertainty, but, as often happens, the anticipation was worse than the reality. We have ceased to tremble at these semi-monthly visitations. We can see now, and that is more than half a victory. Eight hours' sunlight gives us a confidence we did not feel in November, December, and January; and as we know we are daily lengthening our sunlight, and that each day is a day nearer mild and pleasant weather, we are as bold as lions. It seems difficult at times to anticipate any mild weather with the thermometer going on serenely day after day below minus 40°. This month has been a screamer for cold.

When the ice excitement subsided this morning I went out to look for results, and I found that, although generally the floes had come together again, leaving only cracks to show where they had broken, there were a few openings six inches wide over which the ice had formed in an hour one half inch in thickness. Nobody seems to mind the cold much, we are all out every day for an hour or two at a time, and beyond a cold nose (and if it is windy, occasionally a slightly nipped one) we seem none the worse for it. Our chief trouble is

with our snow-goggles, for they quickly frost up, and we cannot see through them. If we go without them we run the risk of snow-blindness, for the glare is terrific.

The refraction is something wonderful. The shapes of distant pieces of ice change very often apparently, and small lumps look inordinately large. Occasionally we sight some enormous blocks which have been broken off and up-ended in the ice pressures. To survey these massive pieces more satisfactorily we plod through the broken hummocks toward them only to find upon arrival that a very insignificant block has been magnified by refraction. A piece seemingly forty feet in height becomes in reality about ten feet.

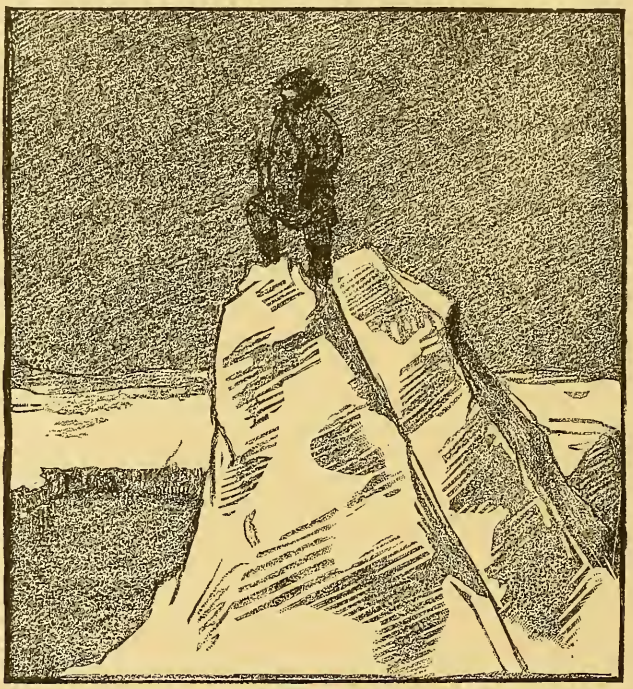
Our auroral displays are falling off in number and brilliancy. There is but one to record in these twenty-four hours. Lunar halos and circles are quite common, the mist which hangs over these openings in the ice during the day seeming to be drawn to the moon regularly and resolving itself into a halo or circle. Of late days the moon has had a "burr" around it in rising, as if she had been dipped in adhesive vapor before showing above the horizon.

February 26th, Thursday. — At ten P. M. the Baxter boiler and engine commenced working the forward spar deck bilge-pump again. This made a pleasant relief for the men, who found the pumping by hand no sinecure. It would be an unpleasant feature of our cruise were the pumping done by hand, for doubtless it would soon break our men down. Valuable as our coal is, the expenditure of two hundred and fifty pounds per diem for pumping is a wise measure, and not to be considered in comparison with the continued pumping by hand and wearing out of men's health.

This unbroken monotony of life, with the steady strain on the mind of perpetually standing by for a mishap, is very wearing, and calls for all of one's nerve to keep cheerful one's self and maintain cheerfulness among one's associates. I hoped that by this time we might begin to look for ice openings, and seals and walruses, but we are having such very cold weather that everything is shut up tight. I even hoped that we might begin to see a glimpse of an occasional feather, but no bird with a well-regulated mind would trust himself in this temperature. We cannot yet feel the want of fresh food, for our stock of seals laid in in the fall has enabled us to have roast seal every Sunday for dinner, and we have one left now for our coming Sunday's repast. We have also roast bear one day in the week, and that is a treat. Our dogs are hardly as well off as ourselves; they are now feeding on the compressed food, which is steamed until it makes a kind of soup hash. This is not as nutritious as fish for them, and does not satisfy their appetites. They are perpetually rummaging around among the empty meat-cans, and picking up what few, very few scraps are thrown over the side. We need a spell of open water and a chance to get some seals, or a walrus, to give them good food and plenty of it.

February 27th, Friday. — The pumping goes on with its accustomed regularity, the steady thump, thump, of the deck-pump being relieved occasionally by the whirr, whirr of the steam-cutter's engine working the main engine bilge-pump. So far as human ingenuity can be of avail, we have reduced the greatest amount of work to the least expenditure of fuel, and we can do nothing more than wait for the mild weather which will surely come by and by, and when we are afloat

again look around us and see what can be done. To make conjectures, or lay plans at this early date, would be idle. Everything will depend on the extent of the leak when the ship becomes entirely water borne, our ability to keep her free, and the amount of fuel remain-



Watching for Seals.

ing on hand. We have all the resolution to push on to the highest latitude that we had upon leaving home, and we can do nothing but wait for time to show whether our ability can be made to keep pace with our desire.

Beautifully pleasant weather. Were it not for the intense cold we should be having weather remarkably enjoyable; skies almost entirely free from clouds, a few

stratus at sunrise and sunset being the only ones; very light variable airs and calms, brilliant sunlight, and miles of ice. So brilliant is the glare of the sun that it is imprudent to go outside of the ship even, without snow-spectacles; for if the eyes do not become painful while on the ice they are almost sure to become so shortly after coming in-board. We have had so much annoyance from the glasses frosting up and thus becoming useless for seeing purposes, that some of us to-day tried wearing horse hair eye guards. These we found to be excellent beyond comparison. They did not frost up at all, were more pleasant next the skin than glass goggles, although the rims of these latter are covered with velvet, and, curious to relate, I found that my near-sightedness was considerably overcome by them, enabling me to see at greater distances and with more clearness and distinctness than with the naked eye. This is a fact worthy of investigation by an oculist at some future time.

The bright sunlight out-board also reaches us in-board, and with bright and cheering effect. The air ports and deck lights in the cabin being cleaned of their accumulation of ice allow the sunlight to stream in, and cheer and brighten us while the excessive cold keeps us shut up. The cabin has a very dingy look. The smoke of a whole winter from stoves and pipes has colored the white paint work to a decided black, and we are almost tempted to commence scrubbing it before mild weather comes. But as it will turn our dry and comfortable quarters into wet and damp ones for several days, we refrain. Now that daylight makes things visible which lamplight hid, I am finding in my room on the forward and out-board sides accumulations of ice and frost, which the steward breaks up with an

axe and removes with a shovel. It seems odd for a man to dig his room out at the end of winter, and such a fact might lead one to suppose that I had had much discomfort. On the contrary, I have been comfortable to a greater degree than I had any reason to expect under the circumstances.

As our days lengthen the auroral displays become less frequent and less brilliant. It is impossible to assign any particular cause for their appearance, or discover any particular effect following them. They have been brilliant in intensely cold weather, and also in mild weather, and again they have been faint under similar temperature; they have existed in all winds and in calms, at full and change of the moon, when the ice has been breaking up and when it has been motionless; in fine, under all sorts and conditions of circumstances. The only prerequisite is a dry atmosphere. It has been said that these auroras are not seen over the ice. All that I can say about that is, that frequently we could see nothing but ice during displays, although there may have been water somewhere.

February 28th, Saturday. — Pumping as usual, and using the steam-cutter's boiler for distilling when not making steam to run the main engine bilge-pump.

Beautifully clear and pleasant weather. Our dogs lie and bask in the sun's rays, and seem to enjoy it, although their wool is stiff with frost. Their hardihood is immense. Lying right out on the floe night after night, they seem to keep warm enough, and at the same time throw out sufficient heat to thaw a hole under and around them an inch or more in depth. Ash heaps and dirt heaps seem to be especially sought for. Alliances are formed for their enjoyment, and the approach of an outside dog is the signal to clear for action.

A few of the strongest dogs take post on board at the door of the cook-house to intercept any supplies, and be nearest the place of deposit if they are thrown over the rail, and a hungry or inquisitive brother is at once driven away by them.

February 29th, Sunday. — At eleven A. M. I inspected the ship. Although the berth deck and deck-house were damp, they were at all events clean. The deck-house, having been relieved of some of the boxes of provisions by stowing them in the coal bunkers, presented more room for free circulation; and although the deck was damp, particularly in the wake of the Baxter boiler on the port side and the stove on the starboard side, the temperature being kept at quite a comfortable point rendered it considerable of a shelter in this inclement weather. In all the drip and dampness on the berth deck we have been able to keep the bedding dry, and there has been no instance of bed clothing freezing to the side as I have read of in some other expeditions. The men are bright and cheerful, surveying with much complacency and evident gratification the pumping of the ship by steam instead of hand power. Our Chinese cook and steward are as impassible and impenetrable in this cold weather as if we were enjoying a tropical spring. Seemingly emotionless, all weathers, all circumstances, are alike to them. Living by themselves in the cook-house, they hold no communion with their fellow-men, but are nevertheless cheerful and contented with each other's society, singing songs or playing cards in the evening, day after day, with no concern for the future and no care for the past. Our two natives, Alexey and Aneguin, thrive wonderfully well. Occasionally they "think plenty" about St. Michael's, being a little homesick, but generally they are bright and

happy. They have learned considerable English (and always manage very cleverly to express their meanings), play bean poker, are as fat as partridges, and are longing for the breaking up of the ice and a chance at the walrus and seal.

They are naturally and intuitively the most polite men I have met outside of cultivated society, and would even compare favorably with some of the choicest within it in that respect. Upon meeting an officer first in the morning, a touch of the cap and a good-morning are immediately tendered. If you do or say anything for them that they see or hear, "Thank you" is immediately your reply. If you thank them, "You are welcome" is ready. And all this in a manly, straightforward way, without any cringing or eye serving. A quiet dignity pervades everything in their intercourse with their shipmates.

March 1st, Monday. — The pumping proceeded as usual until 10.30 P. M., when Melville came to me and reported that the Baxter boiler had broken down, the crown sheet having come down by heat and pressure. This of course necessitated the renewal of hand pumping while repairs were being made. I was surprised to find how easily the bilge-pump got the water down and kept it down by pumping by hand ten minutes and resting five minutes. I am of the opinion that so much ice has got under the ship by direct freezing, and the shoving under of floes, as to prevent the entrance of a very large amount of water by lowering the water head. Of course, when we are water borne again this will be proven or disproven, but it can hardly be supposed that the leak has diminished by the closing up of any wound. We might dispense altogether with steam pumping, so far as our ability to keep the ship free is concerned;

but though this might be practicable for a week or two, it cannot be entertained where months have to be taken into consideration.

Our mercurial thermometer is graduated to minus 49°; but as mercury freezes, or is said to freeze, at minus 39°, it is questionable whether its readings below minus 39° are reliable. At all events, as its reading, hour for hour, is lower than a spirit thermometer placed alongside it, its reading is logged as a nearer approach to the correct temperature so long as it is at or above minus 49°. Below this point it suddenly contracts and falls into the bulb, and there I presume freezes solid. After that moment the spirit thermometers are perforce read and logged. To-day, at the beginning, when the mercury read minus 49°, the spirit thermometer read minus 47°. At one A. M. the spirit thermometer read minus 48.5°, and soon after falling to minus 50° it finally reached minus 53.5°. Before leaving New York, at Collins' request, I directed Green to make thermometers with bulbs of the prismatic colors, but, unfortunately, in transportation to San Francisco, four of the seven were broken, leaving us only red, violet, and black. The object of these thermometers (filled with uncolored spirit) was to determine the effect of the sun's rays acting through prismatic colored bulbs, and so obtain a scale of absorption. One of these (the violet) was exposed to the air to-day, and when our ordinary spirit thermometer read at midnight minus 53°, this violet bulb read minus 47.5°. As this one has agreed very well with our standard mercurial at readings above minus 49°, it is possible that its present reading is nearer the correct temperature than that of the ordinary spirit.

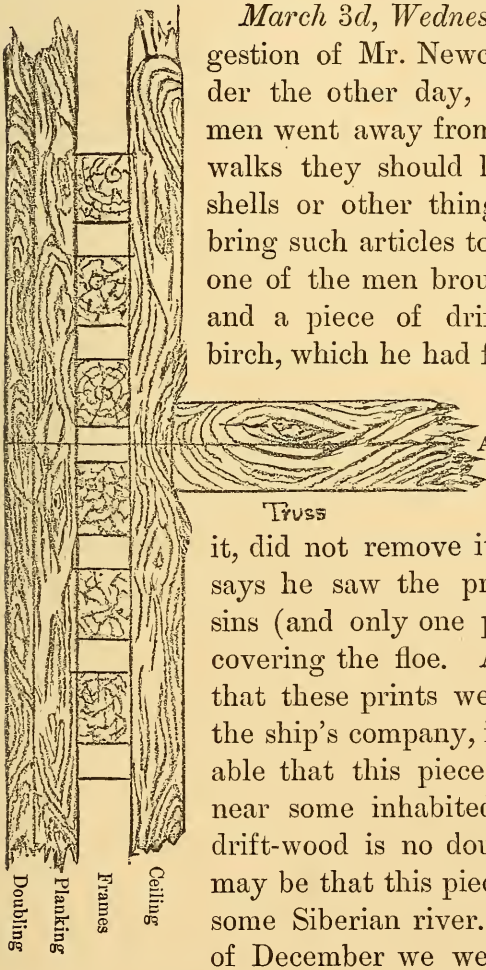
During the last few days I observed that on the port

quarter the snow had melted on the side, and that at noon the frost in the seams was oozing out and trickling down. In order to determine how much of this was due to radiating heat from the ship (the cabin stove being abreast of the quarter), and how much to the action of the sun's rays on the black side, I caused Mr. Collins to blacken the bulb of a spirit thermometer, and this evening it was attached to the ship's side. By experiments made at noon and midnight, I may be able to determine how much heat there is received from the sun's rays.

Danenhower had the sixth operation on his eye today that it has been necessary to perform. The knife and probe are regular things in his case now, and come at regularly shortening intervals. There is no sign of improvement. Day after day it is the same old story. He bears his confinement and the pain of the operations heroically, and his general health and spirits keep up well. But he will never be of any use to the expedition, and I seriously fear can never be of very much use to himself. If he does not speedily reach a place where his surroundings will be more advantageous to his general condition he may have trouble with his right eye.

March 2d, Tuesday. — The usual monthly examination of the officers and men by the surgeon was continued and completed, and his report handed in. Our condition, upon the whole, is satisfactory. The surgeon says, "I consider that the crew have stood the hardships incident to a winter in these latitudes very well; there has been no case of serious disease among us up to this time that could be referred for its origin to our sojourn in the Arctic regions." Of the eight officers, the condition of one is excellent, of six good, and of one

fair. Of the twenty-three men and two natives, the condition of twenty is excellent, and of the remaining five good. The only serious case is that of Mr. Danenhower, which drags along from day to day. Another operation was performed on his eye to-day, and no doubt others will be necessary at short intervals.



Sketch by Engineer Melville, showing the manner in which the ceiling was crushed by the strain brought on the thwart-ship thrust during ice pressures. The fibre was broken and crushed to a depth of three-quarters of an inch on each side. Water line at A

March 3d, Wednesday. — At the suggestion of Mr. Newcomb I gave an order the other day, that whenever the men went away from the ship on their walks they should keep a lookout for shells or other things on the ice, and bring such articles to the ship. To-day one of the men brought in some shells, and a piece of drift-wood resembling birch, which he had found. It seems he saw this piece of wood in December, but attaching no importance to it, did not remove it. At that time he says he saw the print of two moccasins (and only one print) on the snow covering the floe. As it is not possible that these prints were made by any of the ship's company, it would seem probable that this piece of ice came from near some inhabited land; and as the drift-wood is no doubt from Siberia, it may be that this piece of ice came from some Siberian river. As in the month of December we were drifting around

in the neighborhood of 72° 30′, that floe, with its wood and foot-prints, must have come a long distance.

March 4th, Thursday. — Being able to begin to see the condition of things in the coal bunkers, Melville made an unpleasant discovery to-day which he reported to me. I immediately repaired to the port coal bunker, and there, to my unpleasant surprise, saw that the heavy six inch Oregon pine strengthening planks were crushed in the wake of the heavy thwart-ship thrust beam to the depth of half an inch, while the metal bolts forward and abaft of this beam were here and there three eighths of an inch from the planks. In some one of our heavy nips this heavy transverse beam has been literally driven into the side. As in this part of the ship there were new frames and new planking, as well as the extra interior strengthening and the outside doubling, she was as strong as wood and metal could make her. Had I any doubt of it before I should be convinced of it now, that nothing of wood and metal could be constructed to withstand the tremendous pressure caused by moving ice-floes. What the condition of our starboard side may be I do not know, for it cannot be seen by reason of intervening coal. It would be idle to hazard a guess as to what this will cause when the ship is again water borne, so we can only wait and see. Clear and pleasant weather.

March 6th, Saturday. — Pumps going as usual. The water seems to be coming into the ship at about the same rate, no change apparently having taken place for some time in the condition of the ice under the ship. Looked at on the starboard side the ship seems to be completely iced up, or in; her rail and the surface of the ice being on the same level. This is caused by her heel of 3° to starboard, and the fact that we have

been for a long time manufacturing ice. At the beginning of the leak the water was pumped out directly upon the floe, where it of course almost immediately froze. As the ice rose in consequence it soon reached our scupper, and that commenced to freeze up also. Then Chipp set to work and had a hole dug out under the scupper through to the water, and by covering over this hole with boards and snow, secured an outlet for the water from the ship, which was protected from freezing. Since this time we have had no trouble. Should we have a commotion in the ice there is every chance of the ice making a sweep of our deck athwartships, but we have to run that risk. No tools could stand the racket in this temperature, and we must wait for an increase of temperature to enable us to carry out the plan of digging the ship out by cutting a trench four feet in width all around her. Ship's position determined by Chipp's observations to-day to be in latitude 72° 12′ N., and longitude 175° 30′ W., showing a drift of twelve miles due W. since last observations, one week ago.

March 7th, Sunday. — At eleven the Articles of War were read, and the crew mustered, after which I read divine service in the cabin. Cloudy and dull weather. We have had such a continuance of bright, clear, and almost cloudless weather that we resent a change. We are also having a moderate gale, another novelty, and are so spoiled in consequence as to be somewhat disgusted. The temperature, however, increases from minus 33° to minus 22° by noon, and falls only to minus 28° at midnight. S. E. winds have always raised our temperature. The ice has opened in consequence, for much vapor was observed to arise from it to-day.

March 9th, Tuesday. — Taking advantage of the

rising temperature we set to work and dug a trench four feet in width all along the port side, until we uncovered the top of the doubling. This was a heavy labor, bringing in picks, axes, and shovels; but it relieved us of the clinging and holding down effect of this amount of ice whenever the ship should struggle to rise and free herself. When we commence on the starboard side, however, it will be a heavier job, for the ship's rail is almost flush with the ice on that side. Should we retain our present position a month longer, we can fill, or nearly fill, this trench with ashes, and perhaps thaw a small basin or dock in which we can float some time before the surrounding ice breaks up and liberates us. The digging to-day brought up a rare stock of empty cans, which, slowly accumulating since November 28th, had as slowly been covered over by dirt, ashes, and frozen slops. Openings occurred in the ice during the afternoon about a mile to the E. and S. E. of the ship, from which large clouds of vapor arose. The time of new moon being at hand, I stood by for a possible emergency, but beyond a slight shock at midnight nothing occurred. The hunters report having seen seals in the ice openings, but brought none back as the result. A skeleton of a baby seal (picked by foxes no doubt) was found and brought to the ship.

A very curious cirro-cumulus cloud, in shape resembling a cornucopia, arose in the S. W. this afternoon, and slowly mounted toward the zenith. It so much resembled a cloud I once saw in the River Plate, immediately preceding a heavy pampero, that I somewhat anticipated a heavy blow in this case, but nothing occurred. As an experiment, I had, some time since, a quantity of salt beef hung up in the rigging, and another quantity packed in snow in a barrel. After

several weeks' exposure we tried each kind, and were inclined to favor the snow-cured as being the more freshened by the operation.

March 10th, Wednesday. — A long lead of open water is seen about one and a half miles to southward, running in a curve from E. to S. W. Vapor rises from this opening during the afternoon until five o'clock, when ice having formed over it, the escape of the heat from the water is prevented and the vapor ceases. As long as daylight lasted the place of the opening lay like a black band stretched out on the white surface of the ice-field. By to-morrow, no doubt, the salt will have become squeezed to the surface, covering it entirely, and making its appearance more like that of the surrounding floe.

Beginning with the first flush of dawn at three A. M., and ending with the disappearance of twilight at nine P. M., our days are beginning to be very long. At six A. M. the anemometer can be read without artificial light. Whenever at night there is no aurora, we can see a faint gleam of light on the northern horizon at midnight, and thus trace the entire circuit of the sun.

The crew were engaged to-day in digging the trench along the starboard side of the ship. This was a much harder job than digging on the port side, because, on account of the heel of the ship to starboard, a greater depth had to be reached to get to the doubling. The deeper the digging the harder seemed the ice, and, finally, it was so hard and so closely knit together as to resemble flint. The freezing has been so uniform as to leave no pores or interstices, and pick-axes have nothing like the expected effect. Six hours' steady digging and shoveling gave about the distance from the quarter to the mainmast. Another day will be re-

quired to finish the starboard trench, and then we can dig out the stem and finally the bow. The ice has regularly taken the exact shape of the ship, and so closely has it adhered to her that in many places the fibre of the elm doubling is imprinted on the surrounding mass.

The hunters were out again visiting the water lane, and Alexey succeeded in killing a seal and bringing it to the ship. This adds to our larder, for as we have had seal every Sunday for dinner all winter, we had brought down our stock to one half of one seal. These seals, and the almost weekly ration of bear meat, have given us a certain amount of fresh provisions regularly, and have gone far towards keeping us in good health.

March 11th, Thursday. — The open water reported yesterday remained closed over until this afternoon, when it reopened. Nindemann reports having seen a walrus with a young one on the ice. He says the young one was fourteen days old. A bear-track was also seen on the trail of the walking parties of yesterday. Ice openings from S. S. E. and S. W. two miles distant from the ship, and much vapor rising therefrom. The temperature began at minus 27°, and fell to minus 33.5° by seven A. M., and then gradually rose to minus 21° by six P. M. The next hour caused a sudden jump of 6°, and the next of 4½°, the temperature at eight P. M. being minus 10.5° for the first time since January 12th. At midnight it had only fallen to minus 14°. The air seemed deliciously mild at this temperature; after our experience of minus forties and minus fifties so lately, we are not prepared for such a pleasant treat as the present. An immediate consequence has been a thawing of the ice on the bulkhead of my room, and no doubt a continuance of mild weather will occasion a general thaw within the ship.

March 12th, Friday. — "Pump, pump, pump with care," etc. The weather to-day is overcast, cloudy, and gloomy. Accustomed as we are to bright, pleasant days, the occasional advent of a cloudy one makes us feel the difference keenly. But we have had to-day such a novel experience of mild weather that we have fairly reveled in it. The day began with a temperature of minus 14°, and by noon had risen to minus 1°; and although it got down to minus 7° by nine P. M., it rose again to minus 4° by midnight. Heavy clothing seemed a burden, and fires almost absurd. Had the sun been out it would have made the day perfect. Our men digging under the stern worked barehanded and in their shirt sleeves. I kept my air-port open all day and part of the evening, and in fact made a regular "spring opening" of it. The travelers coming back to-day report having seen a track resembling a wolf's, and they bring in a piece of snow-covered ice, bearing the impression. It is pronounced by our experts a track of a veritable wolf. About three miles to the southward Alexey says he came across a bit of open water so wide that he could not see to the other side of it.

March 13th, Saturday. — Pumping and distilling as usual, and I suppose such will be the daily record in my journal until the pennant comes down and the ship is placed out of commission. Sounded at noon in thirty-one and a half fathoms, a S. W. drift indicated by the lead line. Ice formed over sounding hole only two inches since yesterday. This is the best evidence we have had of the effect of the present mild temperature. The weather to-day is rather gloomy again. The sky is overcast, and very fine and light snow falls until seven P. M. It can hardly be called a snow fall, for nothing comes of it. So light is it that as fast as it

falls it is absorbed by the mixture of salt and ice that rest on the surface of the floe, and is lost to us, that is, we cannot hope for any of it to melt and use for drinking water, to let up on our distilling. The high temperature, minus 1° until noon, and even as high as 0.3° at two P. M., and the falling snow, make the floe ice quite soft and soggy, and leave us with damp feet after our hour's walking. This softness is only superficial, however, for our men digging away under the stern find the ice of the hardness of flint. I never dreamed that ice could freeze so hard. But it is proof enough to see pick-axes wielded by strong men breaking off small pieces the size of one's hand, instead of good sized lumps. The mass of ice seems absolutely without pores (though, of course, since the atoms of salt caught up in it cannot be destroyed or eliminated, they must be held in minute cells), and clings to the ship's shape as if it formed a part of her. Except by the pick-axe chipping off and gouging and scoring the wood, the ice cannot be removed next to the ship's skin. So much of the stern post as has been uncovered seems to be all right, and we can but hope that we will find it all right in the future.

The temperature having risen sufficiently to keep our liquid compass unfrozen, the azimuth is taken out to-day, and the ship's head is found to be south 39° W. (magnetic). Chipp also determines our position by meridian altitude of the sun and a time sight of the moon to be lat. 72° 31′ N., and long. 177° 58′ W., almost exactly our position on December 2d, supposing our chronometers have not altered their errors and rates. The drift since the 6th inst., our preceding observation, is thirty-three miles N., 55° W., and as that is a larger amount than we have had in a long time, I

will here record the attending circumstances of the past week's weather, etc., for future consideration of its effect on the drift: —

Date.	Soundings.	Drift.	Amount.	Wind at time.	Velocity.
March 7, Sunday.	31 fathoms.	E.	Moderate.	S. E.	16
March 8, Monday.	31 fathoms.	W.	Moderate.	E.	13
March 9, Tuesday.	31 fathoms.	–	–	Calm.	0
March 10, Wednesday.	30½ fathoms.	W.	–	N.	2
March 11, Thursday.	30 fathoms.	W.	–	–	3
March 12, Friday.	33 fathoms.	N.	Rapid.	S. E.	17
March 13, Saturday.	31½ fathoms.	S. W.	Moderate.	N. E.	7

March 14th, Sunday. — At eleven A. M. inspected the ship. The berth deck was in a fair condition with respect to drip, the rubber blankets being a necessity, of course, over the forward and after berths. Considering, however, all our surroundings, and the unavoidable dampness arising from the steady flowing of water into the fore peak, I must be satisfied. The deck-house, however, was wringing wet. The high temperature of the past few days and the heat arising from the Baxter boiler and stove have caused the accumulation of frost on the sides and roof to melt and run down in streams. The deck was one large slop. So much provisions, etc., are stowed in the house that squilgeeing the deck dry is impossible. Little rivers and rivulets stream out under boxes and barrels. Not having been able to get a winter harbor and get superfluous articles on shore, I have not been able to put this deck-house to its proper and intended use: a living place for the men. On the contrary, it has been nothing but a store-house and workshop.

The ward-room remains dry and comfortable. The cabin has responded to the rise in temperature by thawing the accumulations of ice back of the lockers,

and pouring little streams across the deck. As the ship heels 3° to starboard, these little streams run down hill and collect in little puddles on the starboard side, where they are dried up. The ice and frost back of my desk and book-shelves thaw and run down the curved poop to the bulwark, and thence to the deck, where the steward wipes them up as liquid when he can, or breaks them up with an axe and removes them with a shovel otherwise. And yet the ship's company, as a whole, are healthy, happy, and contented. The individual exceptions are Danenhower and Dunbar. Danenhower's case drags its weary length along, some days better some days worse, although the operations on his eye have not been necessary of late. Dunbar is yet weak and feeble, and seems like an old man.

At one P. M. read divine service in the cabin.

It is, perhaps, worthy of record here that since October 1st we have used but eighteen tons of coal for heating the entire ship and for cooking, and, also, sometimes distilling, and that since January 19th it has required eighteen tons to pump the water out of the ship. The comfort of this latter part is, that whereas we used 11,000 pounds, nearly five tons, to do our pumping the first week of the leak, we are doing the work with 1,845 pounds now, thanks to Melville's skill and devotion to duty.

We have been able to enjoy a rare treat within the last few days. By some miscalculation, I bought so many potatoes the day we left San Francisco that we were unable to eat them all up to the time they froze solid. As cold weather approached, last fall, we stowed them in a coal bunker, and ate them until, by reason of frost, they became insipid and tasteless. In clearing up the other day, we came across a bag which had by

chance remained on deck all winter exposed, save for the protection of the tent awning, to all the rigor of this climate. As an experiment, one or two were placed in boiling water and thus thawed and cooked. To our surprise they tasted like almost fresh potatoes. The heart was black and bad, but enough of the outer body remained to be of use. By thawing a few at a time we were able to get a couple of potatoes apiece at two meals this past week. The difficulty about having them regularly and in quantities is that they turn the hot water so quickly into cold water or ice in drawing the frost, that the proper quantity would defeat the object altogether.

The pumping goes on with its accustomed regularity. Two of our men away on the ice to-day report having fired at a bear and hit him, but he managed to escape. There were brought in to-day from the ice at some distance three species bivalves, one univalve, two pieces drift-wood, some stones, and some sponges. The shells can be accounted for, perhaps, by the habit of walruses in digging them up with their tusks and bringing them to the surface.

March 15th, Monday. — The crew were engaged again to-day in digging away the ice under the stern. Having reached a depth of four feet, water commenced to flow up and freeze at the surface. As much of the stern-post as can be seen is in good condition, and no injury can be discovered around the stern and quarters. Sounds of ice in motion to S. E. and E. at four A. M. Bright, clear, and pleasant weather. The temperature begins at minus 16°, and falls to minus 27.5°.

March 16th, Tuesday. — Sounded at noon in thirty fathoms (muddy bottom). Ice formed five inches in thickness over sounding hole since yesterday. Temper-

ature rises from minus 28° to minus 25° at one P. M., and falls to minus 36° by midnight.

Land was sighted this afternoon bearing S. S. W. (true). It was in the shape of two high mountains, or peaks, with a saddle between them. Supposing the positions in each case to be accurate, the land is the volcano marked by Captain Long as being on Wrangel Land, and distant from us one hundred and ten miles.

The crew were engaged in digging away the ice under the bows, in order to enable us to get at the stem, and perhaps in time at the fore foot, when we can ascertain the extent of our injury. By digging down until the ice becomes fairly thin between the diggers and the water, and letting it freeze thicker below before digging again, we may be able to reach to a good depth.

At six P. M. Alexey and Aneguin, who had been away all day, came back with a bear skin as evidence of having killed a bear. They came across her and her cub about seven miles to the westward of the ship. Alexey's two dogs at once tackled to for fighting, and before the bear was shot she managed with her paws to give one of the dogs a bad wound in the foreleg, and nearly to tear the toes off another. In the mêlée the cub escaped. Knowing that it was too late to get the carcass into the ship, the natives skinned it, and then buried the body under ice and snow until to-morrow. This makes a welcome addition to our food for the dogs, and will enable us, I hope, to tide over the present cold snap until mild weather sets in, opens the ice, and lets us bag a few walruses and seals for them. The ice is getting uneasy again, for at four A. M. sounds of movement came from the S. E. and E., following some short, slight shocks the ship had experienced at three.

At one A. M. faint aurora, chiefly in N. E. and W. N. W. Lunar circle. At two A. M. very faint auroral patches. At three, faint auroral glimmer in W. N. W. The sun was raised by refraction above the horizon before six A. M. At eleven A. M. broken curtain arches 10° and 20° in altitude to N. E., extending from E. to N. At twelve the auroral display is thus described by Mr. Collins: "An exceptionally beautiful auroral display commenced shortly before midnight. From W. by S. to N. E., and chiefly south of zenith from 10° to 15° in altitude, an auroral band extended in a series of flat, semi-elliptical curves opening to the northward. On the inner or northward edge of the band it was brilliantly white, while the light faded down towards the southern horizon to a pale, cloud-like intensity, in which faint lines would occasionally show. To the northward of the zenith very meagre bands of long streamers hung across the sky. A peculiarity of the display was the regularity with which the curves (which were moving slowly along the band from W. to E.) broke into rapid and distorted undulations when they arrived at a point lying within the space apparently occupied by the constellation Ursa Major. There the east end of the curve would suddenly deepen and double back sharply, while the aurora would be violently agitated, and would show the prismatic colors with extraordinary vividness. Occasionally, the organization of the original curve would be maintained, notwithstanding the extraordinary rapidity of the movements around its margin; but usually the curve was broken, or seemed to collapse, to be succeeded by forms in the zenith of outline indescribable because of the rapidity of the changes. At times it seemed as if there were two distinct strata of aurora, the lower one being most agitated, so that

the prismatic colors in modified tints crossed and recrossed each other, while the whole looked like a magnificent pyrotechnic display on which various colors and intense lights were thrown.

"In the W. the band showed occasionally that at a great distance in that direction similar movement was in progress, while to the eastward such a movement was plainly discernible, the rapid changes of the foldings in the band taking the forms of spiral curtains. The whole display, after lasting a half hour, moved to northward of zenith, fading as it went."

In my remarks on the 14th December, I mentioned our experience in reference to a statement of Weyprecht, that "beginning at a certain thickness the ice is almost free from salt." Besides testing the ice sixteen inches thick, we have since tested ice four feet thick, and found it full of salt. Evidently we have not reached that "certain thickness."

In Dr. Kane's narrative of the De Haven Expedition he makes the following statements: "By the time we had reached the middle of Barrow Strait, and the winter's midnight of December had darkened around us, our thermometer indicating a mean of 15° and 20° below zero, the ice attained a thickness of three feet, with an almost flinty hardness, and a splintering fracture at right angles to its horizontal plane. Such ice was at its surface completely fresh, and when tested with nitrate of silver gave not the slightest discoloration." To question such an authority as Dr. Kane is considered to have been is a somewhat rash undertaking for me, but I assert that we have tried all thicknesses of ice, from surface efflorescence to floe pieces eight feet in thickness (which had been up-ended in pressures), and have never found any which would upon melting give potable water. If

his nitrate of silver had any nitrate of silver about it, his test must have been a good one; and the extraordinary, and even marvelous and miraculous, finding of fresh ice (potable water) may be ascribed to the presence of fresh-water ice from the land, which presence can only be accounted for by the equally miraculous floe of melting glacier upon a salt ocean, remaining accommodatingly unruffled until the superimposed fluid had had time to freeze.

Again Dr. Kane says that the floes "which had formed in mid winter at temperatures below minus 30° were still fresh and pure, while the floes of slower growth, or of the early and late portions of the season, were distinctly saline. Indeed, ice which only two months before I had eaten with pleasure, was now so salt that the very snow which covered it was no longer drinkable." In respect to this I can only say that we have tried ice frozen at all temperatures, from zero to minus 30°, and have never had the same satisfactory result. And Dr. Walker, who was with McClintock in the Fox, says (as further and more worthy authority than my statement), "Yet in no case (and my observations extend from below the freezing point to minus 42°) could I obtain fresh water, the purest being of specific gravity 1.005, and affording abundant evidence of the presence of salts, especially chloride of sodium, rendering it unfitted for culinary purposes, much less for photographic use." And he further says: "Perhaps the statement of Dr. Kane that sea-water ice, under certain circumstances, is completely free from salt, may be explained by the following facts and experiments: After our winter preparations had been commenced, and the pool of fresh water (from melting snow) had been frozen over, the men sent out to bring

in snow for culinary purposes brought in some ice instead; this they obtained from some hummock near the ship, these hummocks being part of the formation of the previous winter's pack in which we were caught. The ice turned out to be sufficiently fresh for all the purposes of domestic use. On several occasions the parties sent out for this ice, digging too deep into the hummock, and not content with the surface pieces, found that the ice was no longer fresh, but quite salt — this ice being a continuation of the same hummock, and also of the previous winter's growth."

Now, it is a matter of historical record that the De Haven Expedition had scurvy, De Haven being among the invalids. Weyprecht's party also had scurvy; and later still the English Expedition of 1875 broke down with it. Dr. Kane, with nitrate of silver, could find no salt in ice formed from salt-water; and the surgeon of the Alert says he tested the water used with nitrate of silver, and found it perfectly pure. The water used was from refrozen pools of water on the top of a floeberg. Dr. Walker further says: "On the 12th and 13th August, 1857, whilst lying off Browne Islands, and within about four miles of the glacier, surrounded by bergs, I noticed an appearance like oil on the surface of the water. On closer inspection and testing, this proved to be fresh water floating on the surface of the salt to the depth of two or three inches. The sun beaming down upon the bergs had melted the ice and snow; this running off, floated on the surface and remained separate so long as there was no wind to mix and agitate the fluids of different densities. To a combination of such circumstances, with an after-freezing of this surface water, do these fresh hummocks owe their origin. The water, being frozen in this state, and

afterwards the ice elevated into the hummocks, afforded us a 'drinkable element' during the winter; and when the men had exhausted the supply of top-pieces, they supposing that all was alike, continued their labors, but were disappointed in obtaining salt-water ice instead of fresh."

May it not be within the limits of possibility that the men of the De Haven Expedition dug too deep at times, and that brackish water, or at least not potable water, was consumed in sufficient quantities to sow the seeds of scurvy, which, by hard work and exposure in the case of sledge-parties, and dampness and foul air in the case of the ship-keepers, came to maturity?

As if to remove all lingering doubt as to his meaning, Dr. Kane says: "The surface crust bore me readily this evening at a temperature of 21° and 19°, giving no evidence of thaw. Beneath, for two inches, it was crisp and fresh. As I tried it lower, cutting carefully with my bear-knife, it became spongy and brackish. At eight inches remarkably so; and at and below twelve, salt-water paste. On the other hand, all my observations, and I have made a great many, prove to me that cold, if intense enough, will, by its unaided action, independent of percolation, solar heat, depending position, or even depth of ice, produce from salt water a fresh, pure, and drinkable element." We have conducted many experiments with no such experience to record. And in order that I may have it in a succinct and comprehensive shape, I have requested Dr. Ambler to make me an official report on the whole subject, which will make up our version of the fresh water question. (See Appendix F.)

March 17th, Wednesday. — The crew were engaged again to-day in digging away the ice under the bows.

We have now got down to the eight foot mark, and have such a thin layer of ice between the hole and the water that digging has to cease. If we let the water through it will flow up and freeze, and we shall have a mess again up to the original level; but if we let the freezing go on downward for some time we may be able to dig deeper. In connection with this freezing downward, it is a subject of inquiry as to what depth this freezing can take place. We have not seen any single floe of greater thickness than seven feet, ten inches, and I suppose that eight feet may be assumed as the maximum thickness of floe ice by direct freezing, as stated by Dr. Kane. Dr. Walker says that the floe ice in which the Fox drifted had only five feet of thickness. The floe which we saw and measured as having seven feet ten inches thickness was a portion of floe hove up in the great pressures in November; but whether it was direct freezing, or a series of two or more floes overlying each other, I cannot say. When we floated out to open water on November 28th, I commenced the regular measurement of the ice as it froze by measuring in the fire-hole. The last measurement made was on the 17th January, when the direct freezing was forty-six inches since November 28th. This was a piece of ice formed around us, and which had been up-ended in pressure. Measurements in the fire-hole had become unsatisfactory, because of the tendency of the ice to assume the sides of an inverted funnel, and lead to grave doubts as to the position of our measuring-rod. On the 4th March a crack in the floe enabled us to get a thickness of four feet, direct freezing of thirty days, the freezing having commenced when we had a temperature of minus 36.5°, and continued while the highest temperature recorded was

minus 22°, and the lowest minus 53°. So much of the floe in which the ship is held is underrun by other floes, that finding a clear place to bore for a single thickness is like looking for a needle in a hay-stack. I have concluded to wait until a fresh break will enable us to get a correct vertical measurement of the thickness of ice frozen since November 28th. As ice is a non-conductor of heat, it follows that there must be some thickness at which the ice prevents the heat escaping from the water under it, and places a limit to the depth of freezing. At the time the ice was four feet thick the surface floated only four inches above the level of the water.

The bear which Alexey shot yesterday was brought in by him and a dog-team to-day. Nothing could be seen of the cub.

For the first time in the memory of the individuals of this expedition we have seen a 17th of March (St. Patrick's Day) that was not stormy. One of our dogs, an old one, having a comical and quizzical countenance, had long since been named "Paddy," and to-day he was treated to a piece of green ribbon around his neck, and placed alongside of the Baxter engine, a proceeding so unusual as to occasion him considerable astonishment. The dogs in general, and the names given to some of them, merit a special mention, which I shall give them some day. Kasmatka, Tom, Quicksilver, Jack or Prince, Smike, Snoozer, Bismarck, Paddy, Skinny, Foxy, Plug Ugly, Dewclaws, Joe and Jim, Johnny Armstrong, Dan, and Wolf.

March 18th, Thursday. — Land was sighted in the afternoon bearing S., — the direction of the north side of Wrangel Land. The sky became streaky and ugly looking, promising some bad weather. The wind commenced to moan through the rigging sharply. By

eleven the wind got to and remained at W., blowing at midnight with a velocity of ten miles per hour. At midnight lunar halo 4° in diameter, showing prismatic colors. Strong light reflected from the floe while under the moon.

March 19th, Friday. — A day without any extraordinary occurrence, except that at five P. M., local time, the sun crossed the line coming N., and had as an accompaniment all day a brisk N. N. W. wind, overcast and cloudy about one half the time. Much snow dust driven in the air by the gusts. If it were not for one or two snow storms last fall (which, however, did not amount to much) we should not have known what snow was from our experience here. Much of the snow dust now blowing about is from the efflorescence of the floe. At seven and eight A. M. five sun dogs in the sky. At midnight lunar halo, showing faint prismatic colors.

March 20th, Saturday. — Weather clear and pleasant. To my great satisfaction, as insuring a certain amount of food for the dogs, Alexey shot an immense walrus to-day. So large was he that thirty of the dogs and four men could not drag him in over the rough ice, and he was cut in two and one half brought in, leaving the other half until to-morrow. A rough calculation of his weight would give a ton, although Nindemann says he should have put him at 2,800 lbs. It is a fortunate thing that our dogs are not particular as to what they eat, — seal, bear, walrus, condemned meat, fish, slops, all come alike to them. Quantity rather than quality is the great object for their consideration.

Our position to-day by Chipp's observations of the sun is in latitude 72° 22′ 30″ N., and longitude 177° 27′ 03″ W., showing a drift since the 13th inst. of thirteen miles to the S. 49° E. Until the temperature and the sun's

altitude make it possible to take the daily observations to some purpose, it will be difficult to connect any particular drift with any particular wind. I am quite convinced that during the past winter our drifting has been entirely caused by the winds and not by any current.

March 21st, Sunday. — Pumping and distilling as usual. At eleven A. M. I inspected the ship. The dampness on the berth deck has been somewhat better during the past week. We have been fortunate in keeping the beds dry even at the worst, and but few of the blankets even have got damp. Thanks to rubber blankets, and the system of overhauling and turning up the bedding every morning, the berths have been kept fairly dry and comfortable. Having abolished the fire in the deck-house, except on washing days (Mondays), we save some drip and wet in that place, and also diminish our coal expenditure daily to fifty pounds.

The fire in the ward-room has only been lighted once a week heretofore (Saturday nights, to heat water for bathing), but it made things so uncomfortable for Danenhower (our steady sick man) that for the last two Saturdays it has been discontinued and will not be resumed. All winter the officers have been sleeping at temperatures at and below 32°, and are none the worse for it, seemingly preferring it. The great advantage of it has been the perfect dryness which prevailed there at all times.

At one P. M. read divine service in the cabin. From eight P. M. to midnight we had a fall of soft snow. The temperature, which began at minus 26°, rose to minus 5.5°, making the air feel quite mild and pleasant. The ice was in motion again to the N. E. at four A. M.

The men and dogs went out again this morning and

brought in the remaining half of the walrus shot yesterday, and by great good luck Alexey shot another one, and secured him ready for dragging in to-morrow. This sets us at ease for dog food, for we have now two walruses and one bear as a stock on hand. The last bear killed (a nursing she-bear) does not seem in good condition for our eating, and we shall turn her over to the dogs.

March 23d, Tuesday. — The crew were engaged in digging away the ice under the bows. We got down to a point on the stem where the draught would be six and one half feet, and not caring to dig any deeper, lest we should break through the remaining ice and admit the water, the digging was discontinued. At that depth no injury could be detected, although diligent search was made. The whole bow was dug out to that depth, as far aft as the line of the bulkhead which we built across the fore peak, and not a sign of an injury could be found. I am more than ever of the opinion that our forefoot is the seat of the damage. At midnight, however, all our labor was in one sense lost, for the pressure of the water underneath was too much for the thin layer of remaining ice, and holes were broken through sufficient to flood the large pit under the bow.

The only thing worthy of note to-day was a parhelion at noon, consisting of a circle of faint prismatic colors and 35° in diameter around the sun, with a mock sun on either side, and an inverted arch 2° above it showing strong prismatic colors. Our days are lengthening in the most comfortable manner, although the temperature still keeps low. Broad daylight until 7.30 P. M. is something worth having. A light is needed to read the instruments at eight P. M., and for that only, for there is light enough for all other practical purposes.

It is not so very long ago as it seems to me when I recorded it as something noteworthy that we could read the anemometer at noon without a lantern. In fact, there are some among us who claim to be able to see it even at midnight when there is no moon.

By this morning the water was at the height of ten feet ten inches on the stem, and had there reached its level. I do not think the ship would draw that amount of water were she free to float, for she is no doubt firmly held by the mass of ice which formed around her since our coming here on the 25th November, at which time her draught of water was nearly eleven feet forward. When she does get free I think she will draw much less forward, because we have been steadily lightening her by consumption of coal and by moving so many weights aft. Additional lightening forward will be attempted when mild weather comes, by trimming all the coal and getting more provisions aft, my object being to get the water level below the line of the berth deck. This we can do with a draught of nine feet, and then we can shut the bulkhead across the fore peak and manage to carry the fore peak full of water without danger, stopping our steam pumping and saving coal.

We went to work again to-day digging away the ice under the stern, so as to get the propeller frame and perhaps one blade clear. Land was seen in the afternoon bearing S., — the same two peaks with a saddle between them which we have seen before, and suppose to be the N. side of Wrangel Land.

March 25th, Thursday. — Weather clear and pleasant until ten A. M., the wind prevailing from W. S. W. From ten A. M. to ten P. M. the sky was overcast, and from noon till six P. M. a thick fog surrounded us. Many openings occurred in the ice between S. E. and S. W.,

indicated by large quantities of escaping vapor, succeeded by a water-sky. I am inclined to think that much if not all of the water-skies we read about during winter, spring, and fall, instead of indicating water spaces at that moment indicate where open water has been. For, when openings occur at a time at which the temperature of the air is below that of the uncovered water, such masses of vapor are given off that the air is filled with them in their immediate locality. When the young ice forms on the surface, the escape of vapor ceases. The color of the new ice is dark green or dark blue until the efflorescence occurs, and it is this dark space reflected in the sky as in a mirror (in broad contrast to the dead whiteness of the reflected ice-field) that gives rise to the reports of extraordinary continuance of open water.

In digging away the ice under the stern we succeeded in uncovering the upper part of the propeller frame, and then had to stop lest we should make the remaining layer of ice too thin for the pressure of water from below. No sign of any damage was apparent.

We are extremely fortunate in lying here so long without having serious disturbance. Since the 19th of January, when we were injured, we have had no serious conflict with our enemy. Every new and full moon, however, the ice has opened, and the horrible grinding and crashing has gone on, but at such distances from us as to be inoffensive. Almost every day somebody has seen the result of pressures, — great confused masses piled up thirty and forty feet in height. Sharvell came in the other day and said he saw, about five miles northwest of the ship, ice piled up as high as our mast-head. He evidently regards our destruction, by reason of our reaching that mountain of ice, or that mountain of ice

reaching us, as merely a question of time; for he asked Melville the other day why I was having the big walrus skull cleaned and saved, for when the ship was smashed such a big head would be a heavy weight to drag over the ice.

Although the commotions in the ice at a distance have not affected our floe, it has undergone change from another cause. At different times this winter when we have had trouble close aboard, the pressures and upheavals have made our floe humpy and ridgy, in some places confused piles of ice standing five and six feet, and sometimes twenty feet in height. Not only the height but the shape of these piles has changed. At first I supposed it might have been a kind of settling down or coming in closer contact by downward weight and pressure constantly applied to a smoother floe beneath, but now I have become convinced that it is caused by the wind. The steady friction on the exposed surfaces, in part, and the action of driving snow dust and salty efflorescence acting after the manner of a sand-blast have slowly but surely ground the surfaces down. When in high winds the driving of snow and salt from the surface of the floe has made our faces tingle and smart like so many needle pricks, it must have had an appreciable effect on intervening blocks of ice.

Another curious fact, though easily explained, has come under our notice. The ice floats deeper in winter than in summer. To do this its density must be greater, and our experience in ice digging has shown that it has been of the hardness and closeness of flint. When we came into the ice in August and September, we found it to some extent soft and honey-combed, being so rendered by the warmth of the water induced by the heat

of the summer sun, and in consequence it floated higher above the surface.

March 26th, Friday. — Sounded at noon in thirty fathoms, muddy bottom. Strong drift to W. indicated by lead line; so strong was it that Mr. Dunbar had great difficulty in getting an up and down sounding, the lead being swept off the bottom. Ice three inches in thickness formed over sounding hole since noon yesterday. A fresh gale from E. S. E. and E. all day. The temperature began at minus 12.5°, but by ten A. M. had gone up to zero, and after having reached 4.5°, closed the day at 3°. So much heat was startling, and induced us to face the wind for its soft and warm effects.

Clear and pleasant weather until sunrise just before six A. M., when it became overcast and gloomy and remained so. Much fine driving snow fell, and as soon as it had drifted into little ridges, say six inches deep, I scooped up two handfuls of it and had the surgeon test it; but alas! even newly fallen snow had, in being driven across the face of the floe, caught up and carried along too much salt. I shall soon believe that it drops salt from the sky. We also had a thick fog for five or six hours in the middle of the day. Previous thereto the ice opened and clouds of vapor escaped, and then the opening must have been so extensive as to cause the fog.

March 27th, Saturday. — A breezy day. The temperature commenced at 4°, and went up steadily to 13° as the day ended. Much fog between six and ten P. M., proceeding from evidently extensive openings in the ice to the southward and eastward of the ship. By Chipp's observations to-day we are in latitude N. 72° 29′, longitude 178° 07′ W., showing a drift since the 20th inst., of fourteen miles to N. 63° W. This is prob-

ably the result of the fresh E. and S. E. winds we have had for the past two days. In a few days I shall relieve Chipp of the extra duty of taking sights, and shall make daily observations, when possible, for position to determine the extent and character of our drift, and its connection with the direction and force of the wind.

March 28th, Sunday. — Pumping and distilling as usual. A singular circumstance occurred during the past week in connection with the leak. On Wednesday and Thursday the amount of water coming into the fire-room was about eight times as much as before and since. No greater amount of water seemed to come in forward, but yet it was necessary to keep the steam-cutter's engine going nearly all the time aft. During these two days the forge was lighted in the fire-room, for some machinist's work, and as the heat from it was sent up the smoke-stack we supposed that it might have caused a melting of the ice therein, and thus added to the amount of water in the fire-room bilge. To strengthen this supposition, when the fire was extinguished the water went back to its old condition. But then, to our surprise, the fire-hole, about thirty feet from the mizzen chains, was found closed up, a slab of ice having shoved in under. Now what change could have gone on under the ship to affect the leak? At no time was any sound heard by us in the cabin, the men in the forecastle, or the watch in the fire-room. The whole thing is a puzzle to us yet.

At midnight a faint dawn light could be seen on the northern horizon. At eleven A. M. I inspected the ship. The berth deck has been somewhat drier during the past week, but the deck-house is and has been in a fearful slop. This is unavoidable, because, however un-

necessary heating may have been, during the past week we have been obliged to keep the Baxter going, to run the forward bilge-pump.

If we only could get down to the leak and tinker at it we might do something. If we could have open water enough we might build a coffer dam and get it under the bow; or if we could get the ship into a harbor and beach her, we would be all right: but these things seem impossible in our present position. The amount of care and anxiety on my mind, trying to plan all things for the best, will last me for my lifetime.

A result of the high temperature to-day was the covering of all the bolt-heads on the outside of the ship with frost. The heat of the sun has long since melted all the snow on our black sides, and the round masses of frost stood out like white bull's-eyes. The metal bolts have been so cold that the coming in contact with a warmer air has condensed and deposited the frost. At one P. M. performed divine service in the cabin. Alexey and Aneguin were out to-day in quest of game, and going about two miles to the S. E. of the ship came to open water, in which they shot a seal. While Aneguin came back for a kyack, Alexey shot three more, but unfortunately he only got one out of the lot. It came in time, for we had eaten the last half of our last seal, and wanted one in readiness for next Sunday's dinner.

March 29th, Monday. — Commenced to-day to break out the forward store-room to clean out the frost and get ready for our permanent stowage. This is going to be a serious affair, for the fore hold and fore peak must be kept empty in case of a sudden increase in the leak, and yet we cannot keep our spar deck filled with provisions as it is now. Our efforts will be directed also to getting as much weight aft as possible to bring her

head up, and we are seemingly filled up chock-a-block now aft. However, Chipp is charged with the more than herculean task of finding room for "more" (when everything is filled up), and I have no fear as to the result. We shall be in a fearfully bad trim for sailing; and as for steaming, it is a thing almost out of consideration except for a few days. A glance at the coal account shows that I anticipate having but sixty-three tons of coal on hand May 1st. Keeping thirty-five tons for use in case we are caught here another winter, leaves us but twenty-eight tons for steaming, pumping, and cooking during the summer. The galley uses 1½ tons per month, and for pumping we need, say, 3½ tons; 28 — 5 X 4 = 8 tons for steaming!

March 30th, Tuesday. — By my observations to-day I place the ship in latitude 72° 36′ N., longitude 178° 07′ W., seven miles N. of her position on the 27th inst., and almost identically the same position as occupied on November 30th.

CHAPTER VIII.

UNDER THE MIDNIGHT SUN.

April — May, 1880.

Change of Routine. — Saving Fuel. — Driving a Dog Team. — A New Resource. — Birds. — Dampness and Cold. — Canned Food. — Completion of a Windmill. — Winter Lingering in the Lap of Spring. — Pemmican. — Wasting of the Ice-Field. — Drift-Wood. — Walrus. — Distant Land. — A Deep Hole. — Sunshine at Midnight. — Target Shooting. — Pure Water. — Bears and Birds. — Gloomy Weather. — Habits of the Dogs. — The Crew's Quarters. — Danenhower's Condition. — The Ice as a Sledge-Road. — Bear Hunts. — The Sick List. — Patience and Dullness. — Discouraging Outlook. — Sledging. — New Leaks. — Looking for Release.

April 1*st*, *Thursday*. — This month opens with a very pleasant incident. At 8.15 A. M. Ericksen rushed into the cabin announcing, "There is a big bear right under the quarter." Away rushed Chipp, Dunbar, Newcomb, and the doctor, the three former with rifles. Alexey and Nindemann were already on the ice in pursuit of a fine large bear, all the dogs surrounding it, yelping and barking, and driving poor Bruin almost wild with the din. Shooting under these circumstances was almost certain to result in killing a dog, so the bear was enabled to get away about a mile from the ship. The dogs managed him beautifully. While about twenty of them would surround him out of reach of his paws and distract his attention, a half dozen of them would bite him, making the hair fly by mouthfuls. The bear would then throw them off, and, sitting on his

haunches, reach around for them with his fore paws. This movement gave Alexey and Dunbar a choice point for firing, and Alexey put a bullet into him, which dropped him. He got up again and renewed his fight with the dogs, until Dunbar finished him with another bullet. He was a beautiful animal, eight feet in length, three feet five inches in height, and weighed six hundred and seventy-five pounds gross weight. His stomach was perfectly empty. He had got within one hundred yards of the ship, when the dogs sighted him and made him turn.

A change in the routine is made for the spring and summer. When we are moving again some modifications will occur.

April 2d, Friday. — Daily routine, commencing April 1st, 1881: —

5.00 A. M.	Call ship's cook and cabin steward.
5.45	Call executive officer.
7.00	Call all hands.
7.30	Breakfast by watches.
8.30	Turn to; clear up decks; clear fire-hole; get soundings, etc.
9.00	Watch below to go hunting.
9.30	Clear forecastle; open doors and scuttle for ventilation until 11.30; inspection by executive.
11.00	Hoist the recall flag at the fore.
12.00 M.	Dinner by watches.
1.00 P. M.	Turn to; watch below to go hunting.
5.00	Hoist recall flag at the main.
5.30	Supper by watches.
6.30	Turn to.
8.00	Boatswain and carpenters report the departments.

9.00 P. M. Open forecastle doors, and partly open scuttle until morning.

10.00 Lights out in forecastle; noise and smoking to cease.

By this new routine we still have but two cooked meals a day. The tea water for supper is boiled on the fire in the stoves in the cabin and berth deck as heretofore since November 1st. This arrangement will hold good as long as we keep the stoves going. But as I shall stop them as soon as we can safely (not comfortably) do without them, in order to save every lump of coal, some other way of boiling the tea water has to be devised. While Melville and I were talking it over to-night, we thought it would be possible to make a little fire in the observatory stove down in the fire-room each evening, which would boil all the tea water together. But it suddenly flashed into his mind that as we should be pumping by steam as long as the coal lasted we could boil the tea water by steam also. And with him to think being to act, the whole thing is *un fait accompli.* If we can get along with pumping by the Baxter engine alone, we may have a little trouble in thus boiling the water by steam, because the steam-room is so shallow that salt spray is lifted and carried along with the steam, and would mix with our tea water. If we are using the steam-cutter's boiler continuously, there will be no difficulty, for as it has a steam-drum on top of the boiler all danger of lifting salt spray is eliminated. How we may have to use it and the Baxter together, or only one of them, will appear a little later.

We took out the port forward bilge-pump to-day, and put it down the fire-room hatch into the fire-room bilge, cutting a hole on the after side of the hatch coaming on the starboard side for the pump delivery. When it is

secured in place we shall move the Baxter engine and boiler down to the fire-room, and connect them by gearing somewhat similar to that now in use for the pump brake. Then the Baxter and steam-cutter's boiler being side by side, — the one delivering water on the spar deck, the other delivering water through the side, — we shall open the forward floodgates and let all the water come aft into the fire-room. If the Baxter can pump all the water, we shall save the coal now consumed by the steam-cutter's boiler; if the steam-cutter's boiler can do the work, we shall save the coal now used by the Baxter. At all events, if one alone cannot do it, we may light a fire under the steam-cutter's boiler in time to get tea water for supper, and pump with it also, say twelve hours, using the after bilge-pump by hand occasionally, if necessary, and thus save the coal now burned in twelve hours by this little boiler.

I mention these items minutely, to show how carefully we are watching our coal pile and making every pound do its work. I suppose any sensible person will admit that the propriety of pumping by steam is unquestionable. Under ordinary circumstances of a vessel at sea springing a leak, hand pumping for a long period to make a port is to be expected. But here in the Arctic seas, where for more than two months we have been leaking, and when for perhaps two months more we may be fast in the ice, the situation is quite different. Supposing that we had resorted to hand pumping, very probably one half of the ship's company would have been on the sick-list by this time, or if not sick at least worn out; and had any accident crushed the ship and forced us to abandon her, in what condition would the crew have been to march two hundred miles over the ice, dragging heavy sledges, to the nearest settlement?

Having completed the work of cleaning and restowing the forward store-room, we set to work to-day to perform a similar service for the after store-room. Having only the tent awning over the spar deck to protect it, the beams in the store-room, the pumps, and the iron knees made excellent condensers for all moisture formed below in the ward-room, and passing into the store-room through the communicating doorway. The forward bulkhead of Danenhower's and Collins' rooms, though well felted, likewise acted as condensers. Danenhower's room was thoroughly scraped the other day by his careful nurse, Johnson; but Collins' room, being delayed, commenced to thaw on him last night, wetting much of his clothing. The after store-room was one mass of frost on the parts above indicated, the pumps particularly seeming enlarged to twice their ordinary size with ice.

The usual monthly medical examination was commenced to-day by the surgeon. So carefully has this examination been conducted, and so thoroughly is the men's condition known, and so satisfactory is the state of our health (except in Danenhower's case), that upon the doctor's recommendation I decide to suspend the monthly examinations for the present, say for three months, unless some occurrence makes the resumption prudent.

April 3d, Saturday. — Mr. Dunbar, who seems to be regaining his old strength and endurance (although his gait is more like that of an old man than one of his years), took a long tramp with Alexey and Aneguin about seven miles S. E. from the ship. At that point he came to some very heavy ice, seemingly aground, as it had no motion, although with water around it. The extent of water may have been two hundred feet in

length and fifty feet in width, narrowing to cracks at either end. For several days he and I had observed from aloft a long ridge of ice to the southward, and had made conjectures as to its being stranded on a reef or shoal; and since he has gone out there and thinks it looks much like it, he will on Monday make one more trip to sound. He says that while he stood on the floe edge looking at this ridge, everything being still, there commenced a trembling of the ice on which he stood, and a commotion in the water in front of him, when suddenly a large mass of ice as big as the after part of this ship cut off at the poop came up with a bound, and settled to its line of flotation. Being in some unaccountable manner liberated from the power that held it under the floe, it made its way naturally to the surface.

The surgeon's report is rendered to-day. Of the eight officers, the condition of two is excellent, five good, and one fair (considering); of the twenty-three men, the condition of seventeen is excellent, six good; and the condition of the two natives is excellent.

Danenhower's case has no marked improvement. With the confinement he has undergone, and the certain mental anxiety which he no doubt experiences, it is wonderful that scurvy has not selected him as a fair opportunity. As the temperature falls from 6.8° to minus 13.5° we are evidently not done with winter yet.

The familiar grinding and groaning of ice in motion was heard at one A. M. Somehow or other, I cannot help anticipating a considerable disturbance at our next new moon, on the 9th inst. Our sudden drift and recent high temperature indicate a loosening of the ice somewhere, and if we go toward the place we may become mixed with it.

I had almost begun to believe that I knew how to and could manage a dog team, but I have changed my mind. Hitching up eleven dogs to-day to a heavy sled, Melville and I started out on a cruise. We usually have merely to start the team on an old sledge track or foot way, and then, with the judicious use of a long lashed whip, we can ride on the sledge as if it were drawn by horses until the track ends or we wish to return; but to-day we could neither lead nor drive. The dogs would go a few hundred feet from the ship and then bolt, dragging us back to the gangway. If one of us took hold of the leaders, the middle of the team would double back. Whipping on one side would make them vault to the other, and though we occasionally weathered the dogs by getting the sledge caught in a snow bank, or capsizing it, when the curved ends would serve as an anchor, it would be only long enough to give us a breathing spell; for as we had to get the sled free ourselves, the dogs had it all their own way, and tore us back to the ship. Finally, when almost exhausted with our conflict, we had to send a man ahead with the "sick" dog, who is a chum of Jack, our leader, and so contrived to keep his attention occupied while we managed the wheelers and mid-ship dogs. Even then one of the dogs was so averse to going that he would throw himself down, and be literally dragged by the neck and body for a hundred yards or more at a time, refusing to get up though beaten with the whipstock until I was tired. Thus we managed to get a mile away from the ship, and then giving the dogs the charge they rattled us back gayly.

April 4th, Sunday. — At ten A. M. had general muster and read the Articles of War, after which I inspected the ship. The condition of dampness on the berth deck

is somewhat improved during the past week. The deck-house, having been relieved of much of the load of provisions stowed therein, seems like a spacious apartment emptied of its furniture. By the end of this month the house will be for this season, at all events, a thing of the past, for I hope the temperature will have so far comfortably increased that we may remove it entirely. The forward and after store-rooms having been cleaned and restowed are again in good order and condition, though I fear the low temperature we are now experiencing may cause condensation again, and, later on, result in thaw and wet. The ward-room and cabin are as usual dry and comfortable.

April 5th, Monday. — And now one would imagine that we had arrived at the end of our resources for saving coal without resorting to hand power. But it is not so. Some days ago, in thinking matters over, I recollected having seen pumps run by windmills, and upon consulting Melville as to the practicability of making the necessary machinery on board ship I was gratified, but (knowing his genius and unfailing readiness to adapt the means to the end) not surprised, to have him say, "Can do it." He thought out all the details, and has immediately commenced working drawings for the construction of the windmill bilge-pump. He calculates that with a wind of velocity equal to five miles an hour, we can have a mill that will do the work now done by the altered main engine bilge-pump run by the steam-cutter's engine. Of course when we have no wind we must pump by hand if we wish to save coal, but the number of hours of calm in a month has been so small that I think we can safely take the chances for the future.

Sounded at noon in thirty-three fathoms, muddy bot-

tom, a slight easterly drift being indicated by the lead line. A seal has found our sounding place a convenient breathing hole, and comes there so regularly that no ice has been able to form over the centre of it since noon yesterday, but from the centre outward there is ice six inches in thickness in some places. Sunrise at 4.24, sunset at 7.40. Observed to-day for position, determining it to be in latitude 72° 30′ N., longitude 178° 33′ W., showing a drift since the 1st of eleven and a half miles to S. by W. Temperature begins at minus 21°, falls to minus 23.5° by five A. M. This cold snap is very unwelcome, because we have moved the Baxter from the deck-house, and have long since discontinued the deck-house stove, and that edifice is consequently as cold as charity. Looking forward to the future with the experience of the past, I think it is likely that this cold will continue until the new moon on the 9th, after which I hope we shall have quite a moderate spell.

Mr. Dunbar in his wanderings to-day visited the apparently grounded ice again, and saw quite a lane of open water, but nothing to shoot at. From our topsail yard a narrow ribbon of water can be seen running from S. W. around by W. to N. E., and averaging seven miles in distance from us.

April 6th, Tuesday. — For several evenings past, at eleven P. M., I have noticed a long, low streak in the N. W. that very much resembles land. It cannot be seen on our brightest days, because the sun shines against it and hides it in the glare of the ice. But when the sun gets below the horizon and behind it, it comes out with distinctness enough to at least raise the suspicion that it is land. Of course it may be a stratus cloud, but it is somewhat singular that the same shaped cloud should be in the same place every night.

As the sun continues to set later and later we shall ere-long resolve our doubts.

April 7th, Wednesday. — Having finished all our connections with the new pump rig, and all being in readiness, the combination was tried this afternoon. It worked to a charm. The flood-gates were opened, and all the water was allowed to come aft as freely as it pleased. The Baxter then took hold and pumped it out. While waiting for more to come aft, a source of difficulty was discovered which forces us to suspend the rig until milder weather. The discharge is necessarily through a canvas hose leading from the fire-room hatch across the spar deck to a convenient scupper, and so to a hole which was dug in the ditch on the starboard side through to the surface of the water. This hole, of course, had to be covered immediately with a wooden box and a snow-house to protect the water from exposure to the open air and its temperature of minus 20° at times. But we could not keep the canvas hose and the top of the pump from exposure to the air, and consequently, while the pump was necessarily "spelled" to wait for water, ice formed in the canvas hose and choked it up. The flood-gates were again closed, and the water accumulated in the fire-room from time to time was pumped out as before by the steam-cutter's engine, while the remaining bilge-pump forward was worked by hand as required. This we found to be from five to ten minutes every half hour. The fires under the Baxter were allowed to die out.

Our friend the seal comes still often enough to breathe to keep a hole open in the centre of our sounding hole, and so the ice is prevented from forming with any degree of regularity.

The ice was in motion immediately after sunrise, and

all along in the afternoon until six o'clock. The movement seemed to be confined between N. W. and N. Brilliant parhelion 22° in radius immediately after sunrise, and two brilliant sun dogs at five and six A. M. Although the sun is below the horizon for about eight hours, we have daylight the whole twenty-four hours. That is to say I consider enough daylight existing at midnight to navigate the ship were there open water to make it possible. No regular order of sunrise and sunset can be marked from day to day, the time of these events varying greatly with the refraction. I am scrupulously careful in my observations for position to apply to the mean refraction Chauvenet's corrections for height of barometer and for temperature. At such altitudes the corrections are not very large; but when the sun approaches its setting, for instance, they are so markedly important as to make their omissions a serious error.

April 8th, Thursday. — Our pumping goes on now in this manner: When enough water gets aft into the fire-room to be worth the steam, the little cutter's engine pumps it out. At other times the steam-cutter's boiler distills water. Every time the bell strikes, the man on watch works the forward spar deck bilge-pump until it draws air, which it generally does in from five to ten minutes. Our windmill pump rig gets on apace, Melville being engaged in making necessary forgings, and the carpenters working at such wood-work as is required.

April 9th, Friday. — Our new moon has come, without any of the disturbance I anticipated; not even a jar occurred to note its arrival. The first bird of the year arrived to-day. A raven, flying from the southward, lighted on the ice near the ship long enough to

be plainly visible, and then flew to and disappeared among the rough ice about one hundred yards from us. Mr. Newcomb started after him to add him to the collection, but failed to find him.

April 14th, Wednesday. — To-day our steward went to work clearing out the ice from the tiller-room. This is a new name in my record, and requires explanation. Last fall I had the doors opening from the cabin into the chart-room unhung, and mounted between the propeller well and chart-room bulkheads, completely shutting off the after part of the cabin containing the rudder head and tiller. This shut-out space has acted as a perfect condensing chamber for the cabin, keeping our mess-room dry during the lowest temperature of the winter. I am stating nothing new when I say that all moisture will fly to a cold surface and condense. Shutting off the after part of the cabin has made a cold room into which the moisture has penetrated, through cracks and the key-holes when the doors have been closed, and in volumes through the doorways when the doors have been opened, and ice has formed there from the condensation. Now that milder weather is coming, this must be removed, or else melting, it will run in streams. Of course the condensing chamber has not benefited Chipp's room or mine, for our air ports, forward bulkhead, and the bulwark being exposed outside to the temperature of the air have supplied the cold surfaces nearer at hand for the condensation. The chart-rooms have had some ice, but not much, form on the bulwark and book-shelves against the side, and of course the air ports have been one mass of frost. I am firmly convinced that had our deck-house extended forward to entirely cover the berth deck, the berth deck would

have been dry; and if we had not been obliged to use our Baxter boiler for distilling, and afterwards for pumping, so largely increasing the moisture which was carried to the berth deck as to use up all the cold space presented by the sheet-iron ventilating cover, and air port frames, and demand more, the deck would have been drier than we have found it. As a rule for my future guidance I will say, Provide the coldest surfaces in the desired places, and then the dampness and condensation will be under control. This cold-surface method annoys me in one way, namely, by fogging up the glasses of the roof of the artificial horizon. I have generally placed the horizon on the small table on the floe, but the table, having been moved the other day for some purpose or other, has not been refastened thoroughly enough to keep the mercury still in any wind. I therefore place the horizon trough in the thin snow on the floe, and grind down the roof into the snow to keep out all wind. In a few moments the heat of the sun through the glass next to it raises the temperature within; moisture arises from the warming snow, and immediately flies to the cold surface, first to the glass in the roof away from the sun, and there deposits, becoming a film of ice as soon as the roof is lifted from the snow.

By an accident or carelessness our water supply for the day was spoiled this morning by Boyd, the fireman on watch. Our steam-cutter boiler is fed from the sea always, but on this occasion the feed was taken from the bilge. The result was that the distilled water was so bad in taste as to be nauseating. The water-barrel will need several scourings and cleanings before it loses the bad taste, and for a day or so we must fall back upon snow-water.

Having a large stock of bear meat on hand, I approved Chipp's suggestion to make some of it up into sausage-balls, mincing pork with it and adding powdered herbs. Our St. Michael's salmon were finished yesterday, and I fear we shall find it hard to supply their place. Canned fish cannot be said to be a nourishing or agreeable kind of food. An exception may possibly be made in favor of canned salmon, but that alone. We have a barrel of codfish which Captain Jesperson, of the Fanny A. Hyde, caught while becalmed off St. Lawrence Island, and which he salted down; and as the fish is solid it will be a more acceptable food than the rags and small pieces which all canned fish (except salmon) seem to be.

The work of restowing the small holds being completed, our quarter deck is now quite clear. What a comfort it is to see the deck again after so many months can hardly be appreciated by one who has not been circumstanced like ourselves.

April 15th, Thursday. — This morning upon getting up I was informed that a suspicion of land to N. N. W. was occasioned by the peculiar appearance of some clouds in that direction. Upon going on deck I saw what all seafaring people would call clouds hanging over the land, but though we peered anxiously and hopefully with glasses we could see nothing of the supposed land underneath. A strong corroboration of the suspicion occurred in the sight of two snow-buntings, which flew towards the ship from the southward, and after a moment's rest on the ice flew toward this suspected discovery. They might have remained near the ship, but as soon as they alighted on the ice under our flying jib-boom the lean dog Wolf, always ready for a mouthful, rushed for them and drove them away.

Once more are my eyes gladdened by seeing the yellow top of the poop. We went to work to-day and removed the thick coat of snow which has made it seem all winter like the effect of an avalanche, and the change is more than pleasing. The large amount of dirt, ashes, empty cans, etc., which was alongside the ship to port, was also removed to-day, a faint, disagreeable odor arising from it, warning me how objectionable it might become a month from now. We are slowly but surely cleaning up, and becoming more like a ship than a frozen habitation.

Our bear sausage-balls were tried at breakfast to-day and pronounced good, though hardly seasoned enough. That is a fault easily remedied, however.

Sounded at noon in thirty-three fathoms, a drift to the N. W. being indicated by the lead line. The seal kept a breathing hole open, but three and a half inches of ice formed outside of it.

April 16th, Friday. — We find that removing the snow from the poop, thus uncovering the yellow-painted canvas, presents a surface which attracts and absorbs the heat of the sun's rays, and by radiation upward affects the readings of our thermometers. Accordingly (though the uncertainty of the ice makes their situation risky) the box containing them is removed to the floe, and secured against two upright stakes driven in the ice. The black bulb in vacuo is also removed, and the anemometer will follow. I shall hope now that no sudden smash-up of the ice will involve a loss. I concluded to-day to move out the secretary bureau in my room, and clear out the accumulation of ice from behind it. The drawers had long since become so swollen from the dampness as not to stir; and though I had the carpenter plane them down considerably, they

A circumpolar
MAP
shewing the highest points
reached by different navigators.
From the latest authorities
1850.

pleased to swell up again so much and so quickly that I yielded the point and did not use my bureau again. After a hard fight to-day I got the bureau to move. So much ice had formed between its end and the forward bulkhead and its back and the bulwark that it was frozen as one solid mass. I do not think I exaggerate a bit when I say that over sixty pounds of ice were removed. I took out one slab which weighed about twenty-five pounds; and there were in addition two buckets full of small lumps and scraps picked up with a shovel. The paint work of my room, which had become a fine specimen of black color, was cleaned partially by the steward, and the contrast of clean white to beautifully dirty black is so glaring as to be almost painful to my eyes. The frost in the lower drawer of my bureau had taken full charge, making it necessary for me to work with a hammer and break the ice before I could get a pair of pantaloons out. However, I have suffered no inconvenience during the winter, and by a little work now I have anticipated a thaw.

The walrus meat and the sucking mother bear, condemned for dog food, were some time since removed to the floe from the house-top, and piled up alongside of a whole walrus now lying there. This food is constantly watched by the dogs, who change parties but never relax in vigilance, lest by some mishap the dead animals might get up and walk away. It took them some little time to get accustomed to the order forbidding them to come on board ship at all, since mild weather has set in, and we have cleaned up our quarter-deck; and they would line the gang-plank regularly every evening, like chickens waiting to go to roost. Since they have been feeding on walrus and bear meat they have grown as fat as dumplings, and as lazy as

human beings in the tropics, and they are so averse to work that a sight of harness will make the whole pack skulk off.

Though the highest temperature to-day was only plus 12°, the black bulb in vacuo gave its highest reading at 103°. (If the ice in which we are so firmly held were only black, how quickly would it melt in a vacuum!) The black bulb in the sunlight and air gave plus 30° as its maximum reading.

April 17th, Saturday. — We commenced the day by removing three thermometers from the box on the floe, and substituting three others; in case of any accident I do not want to lose those which we have read and recorded all winter. Our standard, 4.313, is left in the box for continuous record. During the day the anemometer was also removed to the ice, so that we have only the barometers left on board.

The windmill being completed was mounted to-day on the ice, without sails, and rattled away in fine style. We shall leave it running over Sunday to let all bearing parts wear smooth, and Monday place it in position on board ship. It will be tried first with the shifted bilge-pump in the corner of the fire-room hatch, for if it will work that, there is saved the necessity of making a new pump rig of boiler tubes.

We took down to-day the forecastle tent awning, letting a flood of daylight down on the berth deck, where it has been so much needed. And to make room for the windmill, the big skin boat baidera was removed from the bridge, where it has been all winter, and placed on barrels on the floe. Slowly, piece by piece, we shall remove our winter disfigurements, and gain gradually a ship-shape appearance.

A very curious occurrence was noticed by me this

afternoon while taking sights. The artificial horizon was placed on the ice as usual, with the wind carefully excluded by pressing the roof well into the surrounding snow. The surface of the mercury was smooth, and the reflected image of the sun perfectly sharp on its edge; but there was a rising and falling of the image, gentle, of course (else the edge would have become blurred), but so decided that I had great difficulty in making perfect contact. It was as if the horizon trough were in so nearly an exact equilibrium on a knife edge that a breath produced and continued the motion. Could it possibly have been a swell? I have thought much over this occurrence, but cannot account for it. If the whole ice-field had been swayed up and down see-saw, I ought to have swayed with it, and the motion of the mercury would not have been noticeable; but as it was noticeable, could there have been a break between me and the artificial horizon, and my piece have remained fixed while the other one rose and fell?

Considering that we are all (excepting Danenhower) in such perfect health; that our scale of food contains so much fresh bread and canned vegetables, with milk, butter, and other anti-scorbutics; that we have so many fresh potatoes, sixty pounds each week; and that one of our three barrels of lime juice is now consumed (since December 6th, much sooner than I anticipated), I have decided, upon consultation with the surgeon, to reduce our consumption to an issue of the regular ounce on Tuesdays, Thursdays, and Saturdays. I think it would be difficult to mention a more healthy crew in Arctic experience than we are, after our winter of damp, cold, anxiety, and danger. Before long these things will be of the past, and we shall forget them in our expectations of the future.

At two A. M. sounds were heard from the S. E. and E., where the ice was in motion.

April 18th, Sunday. — Another week gone, and but a few miles nearer the pole than we were last Sunday. The winter is "lingering in the lap of spring" with a vengeance. If the spring lingers in the lap of summer in like manner, our progress in any direction is very problematical. One needs an inexhaustible fund of patience under these circumstances, and an amount of hopeful anticipation not called for in lower latitudes. Each night when I write up my journal, I am strongly impressed with the fact that I have made no valuable addition to it, and yet each night I hope for something better on the morrow. Much as I have written here, it conveys no idea of the extent of the thinking, which cannot be recorded properly. No plans can be definitely formed in our situation. Much depends on what is presented to us from day to day as the ice breaks up (if it ever does), the condition of the leak at the time, and our ability to handle the ship under canvas with her necessarily bad trim. When the time comes action will be taken, based generally on the feeling that a fight should never be given up while there is a chance of the slightest success.

At ten A. M. I inspected the ship, finding everything assuming tidy and ship-shape appearances, and being impressed with the fact that if anything more were put in the fire-room the engineer's force would have to move on deck. Then divine service was performed. Our Sunday dinner is always something looked forward to with pleasure. All winter we have had roast seal or roast bear with cranberry sauce, macaroni, potatoes, pickles, bread, a soup, of course, duff, coffee, and chocolate, and always a glass of ale, or porter, or sherry, as

the case might be. I do not think our bill of fare could be much improved.

As will appear from my bills of fare mentioned herein before, one day in the week, Saturday, has been allotted a certain amount of pemmican. Our American pemmican had been exclusively used to within a week, and it occurred to me to give the English pemmican, carried in the Alert, and purchased by Mr. Bennett from the admiralty, a trial; accordingly, an issue was made of it. I confess we did not like it in its simple form as well as that of American manufacture. It was dull and tasteless. The pemmican was of the sweetened kind, much preferred by the English to the unsweetened, as I was informed by Captain Markham. It being suggested that it would make a delicious soup, our Chinese steward was commanded to prepare some and also to make a stew. But as he decided in his own mind that he knew a trick worth two of ours, he mixed so many things with the compounds — for instance, bacon with the soup, and corned beef with the stew — that we were bewildered as to what particular taste predominated, and the experiment had no value. I must admit that the steward made very savory and acceptable food in both cases, but our purpose was defeated for the present. Between the two kinds eaten out of the hand, as might frequently be the case while sledging, we give the preference to American pemmican. Besides having more raisins to increase the saliva, the meat and fat go down together, while in the English article the chewing is drier, and the fat seems to separate from the meat and cling to the roof of the mouth. As a soup and as a stew, I shall express an opinion after a trial.

The wasting action of the ice-field on the surface, as remarked by me heretofore, still continues. From

aloft the view is far less discouraging than it was a month ago. Then the ice-field was all broken up by confused masses and heaps of shattered floes, the result of the winter's conflicts. Under such circumstances I fear five miles a day would have been an impossibility with loaded sledges. Now these masses are greatly reduced, and though rough and hummocky they are not impossible to pass; I think a mile an hour might be made without great difficulty. Then if we had been forced to abandon our ship by her being destroyed we could have reached the Siberian settlements only by a miracle; now, if our ship by some accident is taken from us, our chances of reaching Siberia, or open water, are greatly in our favor. By excellent observations I establish our position to-day in latitude 72° 45′ 46″ N., and longitude 178° 16′ W., and a magnetic variation 22° 15′ E.

April 19th, Monday. — In progressing with the work of cleaning ship the starboard chart-room had its turn to-day. The accumulation of ice was considerable back of the drawers, where the moisture from the cabin had condensed, but not so great as in my room and in the tiller-room. To try to force the backward spring I altered the arrangement of things in my room, closing the door leading into the chart-room, and opening the door communicating with the cabin, and thence by the starboard door to the deck. I am somewhat premature, I find, for my room is too cold for comfort, whereas during the winter I was at least moderately comfortable. Having had the box containing the transit instrument under my mattress ever since leaving San Francisco, I concluded to place it under my berth instead, thereby gaining a more comfortable rest in a less elevated position.

I do not know that I have laid particular stress hitherto on the excellent salt beef which we have. It is served out on Monday regularly forward and aft for dinner, in addition to the regular diet. It is beyond exception the finest salt beef I have ever eaten. Our process of packing it in snow and soaking it in sea water softens it while it entirely removes its saltness, and it is thoroughly enjoyed. To-day our steward surprised us with a delicious potato salad with canned chicken, — a novelty, I undertake to say, never enjoyed before in the Arctic regions after a winter's experience. We have other good things in the shape of ale and porter in barrels. Were I undertaking another cruise of this character I would take three times as much as we brought, at least, and as much more as the vessel could stow. It is beyond all estimable value for cruises of this kind. Hoff's bottled malt extract is no doubt very good in its effect, but from its peculiarly bitter-sweet taste it seems more like a medicine than a beverage. We have had a glass of ale, or a glass of porter, or a bottle of this extract for dinner aft on Wednesdays and Sundays, and forward it has been served out sometimes once a week and sometimes once a fortnight. We made an unpleasant discovery to-day in the shape of fresh dampness on the berth deck. I think that ice has formed between the frames outside of the berths, by the condensation of moisture from the men in sleeping. At all events a drip takes place into the lockers under the berths, which makes it impossible to keep clothing there. At the first of the leak caused by injury to the ship, the water being choked off in the fore peak rose between the frames and flowed over on the berth deck, keeping it wet, and now a similar result is threatened. We shall avoid it, however, by

bolting long strips of battens lengthwise to the deck in-board of the lockers and caulking them, and by boring holes in the deck to let the water descend into the fore peak and flour-room.

Iversen, while a mile and a half south of the ship, found and brought in the following articles: seven small pieces of wood, one bunch of vegetable matter, one piece of birch-bark, and one small leaf. These were, of course, originally from the land, probably Siberia, but when, how, or under what circumstances they left the land must remain a mystery; although we know that being found so close to the ship they are not of this year's arrival. Nothing more has been seen of the supposed land of the 15th inst., so I cannot connect these fragments with it. At midnight heavy water-sky from E. S. E. to S. W.

The windmill was mounted in place over the starboard side of the bridge and secured. Two of the legs of the supporting tripod rest on the bridge, and the third on the water-tank. A hole is bored down through the bridge for the connecting rod which the machinist is fitting, while Sweetman is at work with a new pump brake rig, to connect it with the bilge-pump, in the after corner of the fire-room hatch.

April 20th, Tuesday. — One of the two walruses killed some time ago was left out on the ice close to the ship until the want of dog food necessitated its being cut up. At the time of its capture Alexey remarked that "it had young one inside;" and Mr. Newcomb's zeal to possess it as a specimen almost tempted me to have the necessary post-mortem examination made on the spot. As, however, it would have been difficult to keep the meat from the dogs (while left as it was its soon frozen hide made a per-

fect armor, against which even dogs' teeth could not prevail), I concluded to wait. To-day, however, it was cut up, and to our astonishment, instead of a fœtus, we found part of a young seal (oogook) in its stomach; known to be young because having its first coat of hair. It is well known that the walrus eats shell-fish, clams, etc., which it digs up with its tusks, but this fact proves the carnivorousness of this mammal.

Mr. Dunbar and Alexey while away on a tramp to-day shot and apparently killed a walrus, but he escaped them by sinking. The place recommended to fire at is under the throat upward, that the ball may reach the brain. Such a tremendous bone is over the brain that a bullet will flatten on it. Mr. Dunbar's shot struck him in the neck, and the wound appeared to craze him, for he tore along breaking through young ice, bleeding heavily, without attempting to escape by diving. Alexey then fired and hit him in the head, whereupon the carcass straightened out and sank.

Everything being in place, the windmill was attached to the shifted bilge-pump to-day and set to work. The wind was hardly strong enough to enable it to work this large pump, the mill occasionally hanging fire on the centre. As it was originally intended for a pump of boiler tubes three inches in diameter, making it work a pump six inches in diameter was hardly a fair trial. We were calling upon the pump for four times as much work as it was designed to perform. However, with slight change, we believe we can make it work this pump, and so save the time and labor necessary to make a three-inch pump. The change suggested by Chipp is to remove the canvas sails and substitute tin ones, which being but little heavier will stand flatter and offer more resistance; and this is put in train, the

dozen of empty tin boxes on the floe being used as a stock.

April 21st, Wednesday. — Upon examination this morning we found that the ditch around the stern was completely flooded, the lower layer of ice having evidently been broken by the upward pressure of the water beneath. No serious difficulty is anticipated from this, however, because the comparatively reasonable temperature which we are now experiencing will not cause very heavy ice to form, which would hold the ship down. We are still hoping and praying for a release. We have seen so much water-sky around us that we have grown impatient at our imprisonment, and anxious to move on in some direction or other for a change. A raven (*Corvus carnivorus*) came from the southward to-day and stopped near the ship. But of course the dogs ran for it, and it flew away, proceeding to N. W. A very faint suspicion of land again, this time in N.

April 22d, Thursday. — Another bird paid us a visit to-day, this time a small, dull-colored land bird, which came from the S. E., and being driven off by the dogs flew to the west in an undulatory flight of quick, short, intermittent strokes of the wings.

Snuffy, our dog with the broken nose, has a most wonderful power to hold on to life. Although I know that he will never be of use again, I hardly like to have him shot, preferring to give him all of his life that he can hang on to. Occasionally he seems going, as, for instance, to-day, when he was lying on an old mattress on the rubbish heap, seemingly at his last gasp. Being occupied with taking sights, I postponed his shooting until the afternoon, when, going out to see that he had not died in the mean while, I found him gone one hun-

dred yards or so, and as frisky and far from death as ever. No doubt this is a small thing to set forth at such length, but when all days are alike, and but little occurs to break the monotony, even an occurrence like the foregoing seems an unusual item.

At nine P. M. we thought we saw land N. N. W. beyond a doubt. But as we brought our glasses to bear on it, it was doubtful if it was not a cloud. There was so much open water around the horizon, and so much water-sky above it, that all sorts of shapes were presented to our view in mist or cloud. As we are now where no ship has ever been, so far as is known, we are prepared for some kind of a discovery, and as land is most in our thoughts we are not unwilling to believe the first glance of our eyes.

April 23d, Friday. — Having a clear, bright day after eight A. M., we took advantage of the glorious sunlight to air bedding and clothing, and at the same time scrub and clean the berth deck. It will seem strange to some to air bedding at a temperature between 3° and 7°, but to us the air is soft and almost balmy, and we bathe, so to speak, in the brilliant light. To see our dogs basking in the sun at this temperature, fat and lazy as walrus meat and no work can make them, one would imagine we were in the tropics. As the sun goes down (somewhere now after nine P. M.), and our canine friends begin to come home to roost, the moisture condenses on them as frost, and they look like puff-balls. But still they sleep on, insensible alike to cold and frost. At 8.30 P. M. we had a visit from a snow bunting (*Plectrophanes nixalis*). Before Newcomb could get a shot at it the dogs went for the bird and drove it off. It came from the E. and flew to the S. W.

April 24th, Saturday. — Sounded at noon in thirty-

seven fathoms, a drift to N. N. W. being indicated by the lead line. I got a meridian altitude showing N. 72° 52′ for our latitude, so we are proceeding to the northward, at all events, as well as deepening our water. That we may continue to do so is my fervent hope, for the higher the latitude the more satisfaction, and the deeper the water the greater chance of a speedy breaking up of the ice, by reason of movement by wind or the yet to be discovered current.

A measurement of the thickness of the floe at the sounding hole gives forty inches; and as at the last measurement it gave forty-eight inches, a waste has occurred to just the extent of eight inches.

April 25th, Sunday. — The passage of another week and the arrival of another Sunday becomes memorable, because we have progressed nearer to the Pole by nine miles. During the past week S. E. has been the prevailing wind, and we have correspondingly gone N. W. That we have thus drifted indicates a loosening of the ice to the northward and westward, probably in the neighborhood of the Liakhof (or New Siberia) Islands, from 74° to 76°. As the season advances and the weather grows milder, the ice openings and perhaps movements ought to be greater to correspond, and we may be able to extricate ourselves and accomplish something yet. Our soundings to-day are something extraordinary, — forty-four and one half fathoms (hard bottom), — being an increase of nine fathoms since yesterday. We may have struck a deep hole, or we may be leaving the shallow water in which we have been drifting all winter, and getting to veritable Arctic Ocean. A northerly drift being still indicated by the lead line, we shall be to some extent wiser to-morrow.

At ten A. M. I inspected the ship, finding the berth

deck nicely clean, and, satisfactory to say, quite dry. We are so changing from the torpid appearance we presented during the winter to the ship-shape and tidy condition we are generally accustomed to that, were it not for the leak and the steady pump, pump, we could soon forget all our past discomforts in planning for the future. Following inspection, we had divine service in the cabin.

April 26th, Monday. — Our soundings dropped suddenly to thirty-one fathoms (thirteen and one half fathoms less than yesterday), and as our position to-day (latitude 72° 56′ N., longitude 179° 16′ W.) is only two and one half miles N. W. of our position of yesterday, we must assume that we struck a deep hole.

A bit of excitement occurred this afternoon at 4.30 by the cry of "Bear!" A young, or at all events small, bear had come up to about three hundred yards of the ship, when the dogs gave the alarm, and out tumbled Chipp, Dunbar, the natives, and the dogs in pursuit. His bearship left incontinently, and as the snow-drifts made heavy traveling for bipeds he succeeded in escaping, to our regret, as young bear is fine eating.

April 28th, Wednesday. — By three P. M. the windmill was in place, and connected with the shifted bilge-pump in the corner of the fire-room hatch. The sails made of sheeting having been found to possess too little surface, and to sag in too much, had been removed, and in their places fans made of sheet tin (utilized from our empty coffee and sugar tins) had been secured with wire stops. So well did the new rig work, that at eight P. M. we stopped pumping forward by hand, opened the starboard flood-gate, and allowed all the water to come aft. Up to midnight the windmill was working admirably, enabling us to save a little coal on

the steam-cutter rig, which is now used for distilling only. To provide for light wind, Melville commenced to-day the construction of a pump of boiler tubes, also to be worked by the windmill. To determine by experiment which will be the most economical of fuel, — the Baxter or the steam-cutter's engine, — I directed Melville to use the Baxter hereafter for distilling and unavoidable steam pumping.

Chipp has been hard at work of late making fuses and torpedoes, in anticipation of our needing them for our future operations. We have plenty of powder for blasting purposes, and Chipp, with his torpedo experience, has manufactured the necessary weapons. Mr. Dunbar has earned among us the reputation of making a mile, according to his reckoning, as near two, judging from our feelings, as can be. Last fall, upon the occasion of killing some walruses, he came back for a boat, and as he said the distance was about a mile, the doctor, Melville, and myself started with him, a team of dogs dragging the boat on the sled. We ran the best three miles I ever saw, and were pretty well used up before we got to the end of his mile. To-day, when he started out, I got him to carry a pedometer hitched to his pocket. On his return he said he thought he had gone about three miles in all, but I could see in his face he felt he was saying too much — that he ought to have made it less. The pedometer read five miles. Rule: Multiply Mr. Dunbar's estimate by two, and then judge whether you are game to hold out.

Although I am sure the ice is wasting under the sun, it wastes far too slowly for me. I am anxious to get on. To-day our latitude is N. 72° 59′ 54″ (almost 73°), and I am hoping that 73° is a barrier which, once passed, we shall go on with some credit to ourselves and the name

the ship bears. The snow is soft, and the walking extremely bad. Without any warning one flounders in up to his knees in rifts between chunks, and the shock of the slip and the hauling out of one's legs soon disgusts the most zealous walker.

And yet we cannot find any snow fit to make drinking water. Try we ever so carefully, in our choice to take the newest fallen, to seek the crevices where snow may have lodged on other snow, escaping ice contact, the result is the same, with this exception, I almost believe, that the newest fallen is the saltest. Using such snow for drinking or cooking is out of the question.

Temperature begins at 20°, rises to 25° at noon, and falls to 13.5° at midnight. As soon as the sun sets (now somewhere about 10.20 P. M.) the temperature changes quickly. As long as the sun is in sight one can almost see the cinders and ashes settle in the snow. The black absorbs so much heat that it eats its way down like magic. Oh, as I have said before, that the snow and ice were only black!

April 30th, Friday. — The last day of April. Our total drift, as shown by observations, for the month, amounts to eighty-four and two tenths miles to and fro. Actually made good in a straight line forty-six miles to N. 50° W., — slow progress, and almost disheartening. Still it is an advance, and that is something.

The sunrise was obscured by fog, but the sun set at 11.23, being enormously enlarged by refraction, and having an inverted parhelic segment over it very much smaller than the main disc. This is having daylight with a vengeance. I could not help feeling for those who are obliged to support life (and apparently with comfort) with much less.

Chipp observed a flock of about twenty ducks (eiders)

flying high and steering west. No doubt they were bound for some land in that direction, but though we strained our eyes and glasses as the sun got around there we could see none of it. Removed our cabin porches to-day, letting in much desired light.

May 1st, Saturday. — Sun visible at midnight. The month of May set in with as clear, bright, and beautiful weather as I ever saw, and even the grim, icy monotony of our surroundings was not enough to prevent us from enjoying it. A bright sun, absolutely cloudless sky, and a temperature during the afternoon of from 27.5° to 29.8°, made up together a romantic Arctic day, needing only navigable water to make it perfection itself. Such a thing as remaining on board ship was out of the question. Everybody except Danenhower was out on the ice. Doors were thrown wide open, fires were let die out, and all hands gave themselves up to basking in the beauty without. It may be hard to believe, but really some of us were sunburned to a brilliant red. The dogs actually panted with the heat, and were disagreeably warm to the touch. Our spare sails, which have been exposed all winter to the weather on the poop, were overhauled and found in perfect condition, having suffered no injury whatever, and were treated to a sunning; and generally such an airing of clothing, bedding, and awnings took place, and such a pleasurable bustle, that one was led to look with some expectation to a brighter progress in our movements than had heretofore characterized them. To make the day still more eventful, the sun, which had risen at 0.55′, remained with his upper limb above the horizon at midnight, as if loath to quit so pleasant a scene. By a curious freak of temperature common to us of late, the thermometer commenced to fall as soon as the sun

had passed the prime vertical (about 5.25 P. M.), and as the day closed had tumbled to 1.5°, — a disagreeable reminder that one May day does not make a summer any more than one swallow does.

Mr. Dunbar having in his wanderings come across two sets of bear-tracks about three miles from the ship, along a small lead in the ice, a trap was sent out and set for them. They had evidently caught a seal asleep and eaten it, for blood was on the ice in various places.

A calculation of the amount of the leak, or, in other words, the amount of water pumped over board, results in placing it at 300 gallons an hour, — a vast improvement over February 20th, when 1,647 gallons per hour were pumped out of the ship. The cause of the decrease can only be conjectured, for we may not know it for some time. Either that portion of the forefoot which we assumed to have been broken has been shoved back by ice pressure and closes the leak, or our cement and other material are doing more toward checking the inward flow of the water than we had counted on. I am sufficiently grateful, however, for the saving of fuel thereby resulting, to prevent me from finding fault with either cause.

May 2d, Sunday. — Since placing the compasses in the binnacles on Friday, I have carefully watched them to get a deviation table made up from my magnetic bearings from the ice. A very curious feature has been observed in connection with them. As the temperature falls each night (sometimes getting down to single figures) the needles are drawn to the right several degrees, and as the temperature increases in the morning they gradually go back again, resuming a normal position when the temperature, generally speaking, is 15° and over, as the needles of the compasses (Ritchie's liquid)

are of course not light or delicate enough to indicate secular variations; and as no such movement of the ship in azimuth takes place, I can only account for it by the action of the temperature on the mixture of glycerine and alcohol on which the cards float.

In anticipation of the coming of warm weather and the consequent hunting to ensue, a general cleaning and overhauling of rifles and shot-guns took place on Saturday, some miscellaneous target firing taking place with good results, as showing skill. Everybody felt satisfied that with such marksmanship and the trifling assistance of a bear-trap some game must soon be hanging in the rigging. To-day the trap was visited, but to the disgust of everybody was untenanted. Two bears had visited it, and one had even trodden on it without being caught. In setting it the trap had been buried in the snow, which hardened so much around it as to make it impossible to close. Hence our disappointment. However we have not finished eating our last capture, and to-day at dinner could well appreciate that a bear on the table was worth two not in the trap. At ten A. M. we had general muster, and read the Articles of War, after which I inspected the ship, finding everything trim and neat. Our colors were set for the first time in this part of the world I am certain. At the conclusion of the inspection divine service was performed.

May 3d, Monday. — Our first case of eyes damaged by snow occurred to-day in Mr. Dunbar. The man of most experience, and generally the greatest care in such matters, is the first to go under. His is not a serious case, however, and he will be around in a day or two. His eagerness to try my Winchester led him to wander around looking for bears more than was prudent.

May 4th, Tuesday. — Our experience on this cruise may not only be of advantage to ourselves but it may serve to accomplish an improvement in some articles of Arctic outfit. On one occasion when Melville and I sat looking at our stove and wondering if it could not be made to answer more than one purpose (for so economical have we become that nothing seems valuable for future equipment that cannot do at least two things), the question came up as to whether a stove might not be made to distill water as well as keep a room or cabin warm. Melville promptly said yes, it could be done, and that even our cabin stove might be made to distill, with some additional fittings, a small quantity of water; but that the necessity of arranging those fittings, so that the salt or scale might be removed as it accumulated, would involve such a disproportionate amount of gearing for the result gained, with so much additional consumption of fuel, that we would be not as well off as with our present distiller, especially as we have to pump by steam. Recurring to the subject to-day I asked him to give me his plan of such an apparatus as would heat and distill with the greatest economy, for some possible Arctic ship in the future. I am so convinced that he has solved a great problem and produced an incalculably valuable article of outfit, that I would be almost sufficiently ready to undertake another Arctic voyage for the express purpose of proving it.

Should we be so fortunate as to return without having had the scurvy break out among us, I think it will be because we had pure water to drink, for I do not think that our situation is thus far any less prejudicial to general health than the Tegethoff's or De Haven's Expedition, both of which wintered in the pack and

were afflicted with scurvy to a considerable extent. But inasmuch as the Nares' Expedition were consuming water which was pure (according to the nitrate of silver test, as testified to by Dr. Moss), and yet broke down with scurvy, there may be some other cause to affect us which we have yet to learn (and avoid, for we do not want the proof by experience).

It is very hard and almost impossible to get men to understand the importance of this matter (when I say men I mean the average seaman before the mast). Last fall when I was straining every nerve to keep snow water from being drunk after we found it becoming impure, and burning coal more precious than diamonds, to distill with the Baxter boiler, some outrageous things would occur. Though the men knew that diarrhœa had been caused by impure water, and that it would continue while such water was used, no judgment could be discerned in some of them. For instance, as the supply of distilled water was just equal to the demand for drinking and cooking, it would not be quite cool at all times, and though a moment's exposure of a tin pot to the outside air would have cooled it more than enough, goodness knows, a man would fill his tin cup half full of snow before dipping it in the barrel, not only making his own potful impure but spoiling more or less the water in the barrel. Of course that was stopped, the barrel headed up, and a faucet inserted, and the fireman on duty put in charge of it. Again, the cook finding the snow water, for cleaning dishes, etc., pleasant enough to the taste, would add much or little to the tea water as the distilled water was more or less scant. This could be stopped and was stopped. To him the idea of necessary quantity was more important than any over-sensitiveness as to quality. These merely illustrate the lack of judgment.

Now the difficulty arises about insuring the wearing of snow-spectacles. They are inconvenient, and to some unpleasant, but none the less important and necessary. Though they may not entirely prevent snow-blindness, they will guard against it longer than an uncovered eye, and make its effects less painful and lasting. I see that human judgment will lead the average seaman to prefer certain snow-blindness to a probable freedom from it, and hence I shall issue a stringent order on the subject.

At four o'clock this afternoon a large bear paid us a visit, and but for our haste might now be adorning our rigging. The reporting of a bear sets us all on fire, and away we go. When Ericksen came into the cabin and said "Bear," out jumped the doctor, Newcomb, and myself with rifles and sped over the side. The dogs seeing us rush jumped to their feet, and scenting or seeing the bear about two hundred yards off made for him. That was enough; he turned and ran. I fired at him (hitting him, I afterwards learned, in the left fore-shoulder), but on he sped, dogs and all in chase, and though hotly pursued he gained so much that when at three miles he came to a water lane one hundred yards wide, he had time to swim across it, and gain some hummocks on the other side before Alexey got to the edge. Here Alexey fired, and says he hit him, but he went down behind the rough ice and was seen no more. He says before he fired he saw the blood flowing from the bear's left shoulder, and had seen the bloody trail he left behind.

A pleasant report came back from the open water that there were "plenty birds," and as we are much interested in that fact from love of bird pie as well as for naturalist's reasons, Mr. Newcomb prepares for a battue on the morrow.

May 5th, Wednesday. — To-day is memorable as showing our position to be west of the 180th meridian, an extraordinary occurrence in view of the stiff N. W. wind and the indicated drift S. E. by the lead line. Either our ice-field must have acquired sufficient movement during the long continuance of S. E. wind to work to windward with the change, or we are in a N. W. current. I do not change the date, for in a day or two we may begin to go back and soon find ourselves east of that meridian, necessitating a further change, and so on back and forth. When, therefore, we are so far in east longitude as to make our crossing to west longitude again a question of considerable time, I shall change our date. Meanwhile we will go on as before.

Our position exactly is in latitude 73° 11′ 24″, longitude 179° 37′ 30″ E., a drift of eight miles N. 63° W. having taken place since the 1st, or two miles a day perhaps. Newcomb and Alexey went out on a shooting excursion and brought back three guillemots. Nothing could be found of the bear shot yesterday, and so we are that much out.

The Black Guillemot.

May 6th, Thursday. — A party going to the lead three miles S. E. of the ship found it slowly closing up from the movement of the floes, and they saw some guillemots and the tracks of a fox.

Tests for carbonic acid at ten P. M. on the berth deck give 1.69 volumes per 1,000, or .169 per cent. A very good showing for people living under our circumstances.

May 7th, Friday. — The water-sky is much diminished in extent, and travelers to the open water S. E. of the ship report it frozen over.

A FIGHT AMONG THE DOGS.

May 8th, Saturday. — The coming and going of one more day and nothing gained. This kind of life is really becoming monotonous. Each day finds our coal pile diminishing, and no sign yet of weather which would make it safe to stop our fires on the berth-deck and in the cabin. A temperature of 32° would be as acceptable as possible, although it is the freezing point of fresh water. This day commences with a temperature of minus 3.7°, and though the wind blows from E. S. E. all day, it gets no warmer than plus 12° at midnight. The weather is gloomy, depressing, and disagreeable. Velocities ranging from ten to twenty-three miles drive the snow from the face of the floe in clouds, and other snow falling makes distant objects, say one hundred yards, invisible. Here and there alongside the ship a little white lump indicates that there is a dog beneath it, and even the regular and irregular dog fights are discontinued until the weather gets clearer and friend can be distinguished from foe. I have intended for some time to dwell upon the peculiarities of our dogs, but each time the subject has seemed too extensive for my daily journal. Why they fight, how they fight, and whom they fight, seem to be purely abstract questions with them, so long as it is a fight. For instance, dogs one and two will see dog three in a good position, perhaps enjoying a meat can that has been empty for months and has, of course, no nutriment. As if by concerted plan one and two will spring on three, roll him over, and seemingly tear him in pieces. Fortunately the wool is so long and thick that an attacking dog gets his mouth full of hair before his front teeth reach the flesh, so no great damage is done generally. The vulnerable places are the ears and the belly. I have seen an attacked dog run, and, lying on

his stomach, shove his head into a snow bank with impunity, while his foes were choking over the hair they tore out of his back. However, this is a long digression. Suddenly dog three will turn on dog two and be promptly aided by dog one, his previous foe. By this time the whole pack has gathered as if by magic, and a free and indiscriminate fight occurs, until the advent of the quartermaster with the whip and a merciless application of it breaks up the row.

They divide up into little gangs of three or four, and in these friendly cliques they also fight. For days everything may go on smoothly, when one of the set does something offensive to his mates, and one of them (or sometimes all of them) administers a thrashing, and the offender is sent to Coventry until their feelings calm down. It is a common occurrence to see a dog on the black list, a quarter of a mile from the ship, all alone and afraid to come in until his time is up. He then approaches fawningly, wagging his tail deprecatingly to become reconciled, and is either welcomed with wagging tails or snarling teeth, in which latter case he retires to his isolated position for another spell. Another peculiarity is, that though they make no demonstration at any dog singly, or a team, going away, except the most doleful howling in concert, they seem to consider it a terrible indignity that he or they should presume to come back. The remainder of the pack scent the arriving one, several hundred yards off, and gather awaiting him. If a team comes in, a rough-and-tumble fight commences between the harnessed and the free, which requires two or three men to stop. As soon as the harness is off they are all smooth and quiet again, the cliques reassembling and moving off to their usual haunts. If a single dog, so much the worse luck for

him. As soon as he appears they are all on him. Let him be never so wary, and slink around hummocks to reach the ship unobserved, some one dog sees his head or his tail, gives the signal, and away they go. It is then a question of speed, for if the single dog but reaches his usual sunning or stopping-place he is safe; for, by some rule always observed, the getting to home base restores him to the full rights of citizenship. The cautious approach, and the great speed on the last stretch, are worthy of much higher intelligence than we usually give to dogs. The care they bestow on each other in distress or trouble, arising from disability, has a marked exhibition in the case of Jack and Snuffy. Snuffy had his nose bitten into in a fight at St. Michael's last summer, and in consequence his head is twice the natural size, by swelling and diseased bone. Jack is seemingly Snuffy's brother, and he is devoted to him beyond much human fraternal affection. He stays by Snuffy, cleans him, sees that he is not molested by other dogs, follows him into enemies' camps, leads him through in safety, and guards his retreat. Let Snuffy get a tid-bit, like an old moccasin or a piece of hide, Jack sees him secure it, stands by him while he chews it, and if he leaves it, chews it for him until he seems to want it again, when it is promptly surrendered. So accustomed have the pack become to this sort of thing, that they permit many liberties with their food which they would resent with a well dog.

Their cunning is extraordinary. Going out the other night at twelve for meteorological observations, about a dozen of them came around me in great excitement about something or other. Looking around for a cause, I observed a good-sized dog head first in a barrel at an angle, with only his tail and flanks sticking out. He

had gone in for some walrus meat at the bottom, and no dog had driven him out, because his stern view was not recognizable as belonging to a bully or not. Anxious to save the meat I went to the barrel and drove him out, when half of the gang recognizing him as no great fighter, pitched into him, while the other half fought among themselves for the entry into the barrel. For fear of catching a Tartar they had waited for some one to solve the conundrum, "Who is in the barrel?"

May 9th, Sunday. — At ten A. M. I inspected the ship. The berth deck is now dry and comfortable, and in good order and condition. I think our men really enjoy it; for, considering the size of the vessel, it is really cheerful and spacious. Far removed from the officers' quarters, there is no restraint upon the men's singing, smoking, and card-playing within prescribed hours, and they are made to feel at home. All the work being done in the deck-house, and the provisions being obtained from other places, there is nothing to interfere with their perfect occupation of their own quarters. The steam-pump auxiliary is in its new place in the store-room, which, by the way, is about as fully stowed as an egg, but dry and orderly. The deck-house is one large work-shop and receptacle for knapsacks, parkies, and boots, relieving the berth deck of much impedimenta. The galley-house is clean and remarkably tidy, the berths of the two Chinese being models of neatness. If the two that we have are fair representatives of their race, I consider them a wonderful nation.

The cabin is of course dry, neat, and comfortable. The ward-room is dry, but needs a scrubbing about the deck and paint work, which we are as yet unable to give it on account of low temperatures, and the danger of adding to Danenhower's disability. In him I can

see no change: if his eye seems to improve for a day or so, it only precedes a fresh outbreak, which makes it difficult to say whether or not it is as bad as it ever was. Being allowed by the doctor to be about the cabin during the day, with one eye covered up entirely, and the other protected by a colored goggle, and even in dry, warm weather, to go on deck under the awning for a few moments, carefully changing his foot-gear for rubber boots before going out, and changing back on coming in, — he became over-confident, began looking at and trying to distinguish too many things, then went a step or two outside the awning, in the full sunlight, and finally delayed changing his foot-gear, and the result is he is down in his room in the dark again, only allowed to come up to breakfast and supper blindfolded. How his case will terminate I cannot say. After inspection, divine service was performed in the cabin.

May 10*th, Monday.* — Another day of perfect monotony, waiting for the mild weather and open water, which do not come. Strange to say, however, good observations placed the ship four miles W. of where she was on the 7th. Either we have been in the mean time further W. and have come back again, or else lead-line indications are valueless. Latitude 73° 9′ 49″ N., longitude 179° 9′ 55″ E. If this latitude were only 83° 9′ 49″, how much better satisfied I should be with our work of exploration.

May 11*th, Tuesday.* — An absolutely uneventful day. At three A. M. an occasional crack could be heard from the ice about the ship, but very faint and of no importance, unless it be a sign of wasting away. Really the sameness and monotony of this hoping and waiting are wearing upon me. Were we somewhat further north, we would not expect milder weather or a breaking up until

much later, but in our position I think I am justified in expecting a let-up soon.

May 12th, Wednesday. — A cloudy, gloomy, uncomfortable day. A seal was brought in, but unfortunately it was of the tee-gong (?) species, unfit to eat because of its strong turpentine taste. The odor from it as it lay upon the ice was sufficiently indicative of its character. I keep his skull. Mr. Dunbar and Alexey each shot a guillemot with a rifle, almost tearing the birds in pieces. As an evidence of good shooting, it was a decided success. And with this small record of a day's doings I must be content.

May 13th, Thursday. — The usual monotony of our daily existence was pleasantly broken in upon. Nindemann and Alexey while out to-day shot a seal and two guillemots, which they brought in, Nindemann dragging the seal behind him, — a laborious task, which he said had lasted for about seven miles. Mr. Dunbar took the entrails of the seal caught yesterday, and went out to set a bear-trap in the afternoon. At 9.30 P. M., Ericksen having the deck, Chipp went out to have a look around before turning in, and from the roof of the deck-house he saw, two hundred yards on our starboard bow, a large bear sitting on a hummock gazing at the ship. In a moment Chipp and Newcomb were on the house top with their rifles. Chipp fired first, and thinks he hit the bear; Newcomb fired next and hit, and then Chipp fired again, hitting this time without doubt, for down he went. The dogs quickly gathered around him, and Mr. Bruin got on his feet and made good traveling over tremendously bad ice and snow-drifts, although he was bleeding freely. The doctor, Chipp, and myself followed Newcomb in the pursuit, and by the time the bear got one quarter of a mile from the ship he halted,

showed fight to the dogs who stuck to him, giving Newcomb a chance to put another bullet in him, tumbling him over this time for good, and we hauled him into the ship. He was eight feet eight inches in length over all, and five feet ten inches in girth, and weighed about eight hundred pounds, rather old, but fat and tender, and a welcome addition to our larder. The head and skin were given to Mr. Newcomb, at his request, as trophies. The traveling, as I said before, was tremendously bad. The surface of the ice-field around us from a distance of two hundred yards outward is all broken and hove up, the up-ended pieces of floebergs standing at all angles and in all positions. The small amount of snow which has fallen during the winter has been swept in masses of drift in all nooks and crannies and spaces, making a most uneven surface. Here and there the crust has hardened enough to present an appearance of strength. One trusts himself on it, and immediately sinks to his waist. To get out is difficult. To get one leg out, the weight of the body must be brought on the hands, and they in turn sink in the snow, and the leverage is lost. Flounder, flounder, until by chance one foot strikes a piece of ice underneath, which gives support while the work of extrication is completed, followed very probably by another sinking, and so on *ad nauseam*. Frequently one comes to a more dangerous place between two floe-piece edges, — for instance, an end with a snow pit between, into which he sinks unexpectedly to his breast, and has almost literally to claw himself out with his nails. In fine, even the dogs flounder and struggle in vain, and some of them have to be helped out by man. Only the bears seem to have a knowledge of these pitfalls, and they profit by it.

I can now very well understand the enormous diffi-

culties of Captain Markham in his struggle northward from the Alert's winter-quarters, and I cheerfully admit the correctness of his cousin's remark, that no sledging could accomplish anything on the rough ice I would encounter north of Behring Strait. If anything should force us to abandon our ship, I am satisfied that we should be unable to drag enough provisions to enable us to reach Siberia; and that, unless aided by the growing improvement in the season we could kill enough to eat as we journeyed, our only salvation would be in coming to open water early in the distance, as did Weyprecht's party from the Tegetthof.

By my observations to-day, I locate our position in latitude 73° 7′ 46″ N., longitude 178° 57′ 45″ E., — a drift since yesterday of a mile and a half W. being shown. Whatever theory may have been advanced as to currents in this part of the Arctic Ocean, I think our drift is demonstrating that they are the local creation of the wind for the time being. As our drift in general resulting direction has been N. W. since our first besetment, so is it a fact that the greater amount of wind has been from the S. E., — our short and irregular side drift east and west and occasionally back to south being due to correspondingly short and irregular winds from N. W. or E. A glance at my wind record will make that clear.

As yet no land. Our log is headed, "Beset in the pack to the northward and westward of Herald Island," because Herald Island is the most northerly land we have seen; but Herald Island is now S., 41° E., 142 miles distant, and is rather remote to date from. A flock of birds flew across the bows from E. to W. this morning, as if indicating a land in that direction, but we can as yet see nothing of it.

May 14th, Friday. — It never rains but it pours — bears. This morning, at four, one approached the ship from astern, E. N. E., but before he got within good range the dogs saw him and made a rush at him. Mr. Collins started in pursuit with a revolver, but it was no even chase. A bear seems able to go when the traveling will use up a man. The temptation to follow in this case was strong, for at about every hundred yards the dogs would bring the bear to for a moment or two and allow Mr. Collins to get almost within revolver range. In this manner he went a mile and a half, and then relinquished the chase to Alexey and his dogs. These followed several miles, but Mr. Bruin was not overtaken.

Later on, Chipp saw another one on our port bow. He fired and hit the bear, for over he went; but taking to the rough ice Bruin got away, although chased. Ericksen and Bartlett followed on his trail, and after a tramp of seven miles lost him at some young ice. It is too bad that these animals have so much life, for those that are wounded probably die at some later time from the wound, and of course are lost to us. It seems necessary to fill a bear so full of lead that he cannot carry it to induce him to give up the ghost near the ship.

The new crank shaft and centre bearing of the windmill being finished the mill was again mounted, and attached to the shifted bilge-pump in the corner of the fire-room hatch. The wind was hardly strong enough to work the pump steadily, but still it did some good service. The engineer's force immediately commenced the construction of a small pump of spare boiler tubes, which will be run by the windmill in light weather. The men having completed digging out the trench afresh were occupied in various works about the ship,

particularly in cleaning and spreading to dry seal skins, in readiness for soles and moccasins. We must commence to provide for our necessities of next winter in that direction, for the amount of wear and tear on our moccasins has been very great during the past winter.

May 15th, Saturday. — Again a bear. Mr. Dunbar went out this morning to examine the bear-traps, and saw indications of their having been visited, for all the bait was gone, and the trap turned over without having been sprung. He and Alexey and Aneguin followed on the track, and after a long tramp saw two. One got out of range too quickly for a shot, but the other was keeled over and secured. Strange to say, it took seven bullets to do the work, a sort of running fight and firing being kept up for two hundred yards or more. At the end of five shots the bear again staggered to his feet and was making off, when two more bullets finished the affray. The prize was a she-bear, very thin — as Mr. Dunbar says, "all spars" (*i. e.* all legs and neck), having evidently been nursing a cub for some time, or having just weaned one. Very probably it was the full-grown cub that got out of range, leaving his mother to face the music. Upon being brought in and cut up, it was found that four of the seven shots fired had penetrated vital parts, that is to say, had injured such parts as would infallibly have caused death within an hour, and yet the bear was ready to get away to rough ice, and thus escape.

In the afternoon the doctor and I went out with Mr. Dunbar with a dog team to bring in the game, and I thus had a fine chance of "seeing the country." Going out S. E. a mile and a half we came to what had been an opening, but was now covered over with young ice. Following this to N. E. for a mile or so, we came to its

end, and then striking to N. W. had some very heavy traveling until we struck a long lead of young ice, extending N. E. about three miles, where it ended at very old and very heavy ice. Leaving this we doubled back S. W. to the ship. One has need only to make such an excursion to be satisfied of the still greater perils we have escaped than those which we have endured. Where some of these floe edges have met and fought, rearing themselves fifteen and twenty feet in the air, no ship could survive.

Excellent observations to-day place us in latitude 73° 13′ 3″ N., longitude 178° 52′ 45″ E., showing a drift since yesterday of three and three quarter miles to N. 7° W. Besides being satisfactory as indicating progress of some kind, it is worthy of note as being the highest latitude yet attained on this side of the Arctic Ocean (that is on the sea), Collinson's furthest being, I believe, 73° 11′. And yet no land.

Sounded at noon in twenty-nine fathoms. Muddy bottom, a rapid drift to N. being indicated by the lead line. This is caused no doubt by a coming southerly gale, for the wind to-day is S. E., with velocities from eight to eleven miles, and there seems to be a generally unsettled look to the weather, which promises wind. The ice seems not only to exert a deadening effect on winds when they reach us, but actually to retard their advance. I venture to say we have never had the severity of a storm within the pack that has prevailed on its borders. Our highest anemometer velocity has been only forty miles, and it seems almost incredible that one should pass a winter in the Arctic Ocean with nothing greater.

May 16*th*, *Sunday*. — And again a bear. Mr. Dunbar went out with the natives this afternoon to visit

the traps, and finding nothing therein concluded to go in search of some game or other. After some little wandering he espied a bear some distance off, advancing toward him. Getting down behind some rough ice, Mr. Dunbar and Aneguin held the dogs down and awaited results. After some backing and filling, the bear concluded to advance in their direction, which he did for some distance before turning off, when the dogs were let go, and brought him to bay until Mr. Dunbar got a bullet into him. Then began a time. The bear made for the young ice and open water, and though shot again, managed to jump in, and went under. He swam for some distance under water, his track being indicated above him by the rippling; but he was obliged to come up for air, when Dunbar got a bullet into his head, which, after knocking out a big tooth, lodged in the brain and settled the case. To get the prize was now in order. Dunbar and Aneguin could not pull the carcass out of the water, though they had a line fast to it for that purpose. So leaving Aneguin to hold the bear, which required all his strength, Dunbar chased around until he came across other hunting parties, whose men he pressed for service, and whose dogs, aided by his own, brought in the game to the ship. Net result, five hundred pounds additional fresh meat; head and skin going to captor. Another male specimen, inclined to be "all spars," like the female of yesterday. Bears are becoming so common now that we feel that we want some ducks by way of a change.

To-day all the pumping was done by the windmill. A light easterly breeze almost died out in veering to S. E. at four A. M., but it soon sprang up again, still veering to S. S. E. and S., becoming gradually quite fresh, until at midnight it was blowing at a velocity of nine-

teen miles an hour, with some very hard squalls. The windmill could not begin to find enough work to do, the bilge being kept dry. As we have been somewhat annoyed with a smell from the bilge for the past few days, we clean bilges in a rough manner to-day, by opening the sea cocks and letting in additional water, stirring up the mass and scrubbing with brooms, the windmill pumping out the water as readily as we could wish. As there has been a steady inlet of water and clear flow since January 19th, one would imagine that our bilges were clean, and, as far as clean, bright wood can indicate, they are. Unless there is some chemical decomposition of the sea water, or some decaying animalcule, I am unable to assign the cause for this odor to our bilges, and even if it is from one of the two causes above mentioned, I am unable to say from which one.

At ten A. M. I inspected the ship. We have now three on the sick list,— Danenhower, as usual, Sweetman, with neuralgia, and Ah Sam, the cook, with a kind of intermittent fever. Sweetman has had a bad tooth for some time, and the doctor has been unable to extract it because of its being, apparently, interlaced at the roots; and I am inclined to think the neuralgia is the result of that trouble. Ah Sam's fever may have arisen from a cold. These are two valuable men, and their sickness excites our warmest sympathy and consideration. The carpenter work may stand still, but the cooking must go on. In this emergency the steward calmly does his own work and the cook's too, just as naturally as, when the steward was sick, the cook performed both functions. This is another cause of my profound admiration for this race. I verily believe that either or both of them would undertake any duty,

and master its details in so short a period that their ignorance would not have time to become apparent.

To satisfactorily account for the small increase over last week's consumption of coal, 2,910 pounds, last week's consumption being 2,650, I may here mention that shavings, splinters, and small pieces of wood are beginning to come down to the bunker door with the coal, and are consequently shoveled into the buckets as fuel. There is also much fine dust which goes to swell the weight. As it all burns, however, it is considered as so much coal, and so weighed and served out. Melville's reasoning is, that nothing is lost by such an operation, because, he says, "We know that all that is not expended is in the bunker, which is a good place." I am more certain that we have more coal in the bunkers to-day than the books call for, than I am suspicious of our running short.

May 17th, Monday. — One more day come and gone, like many of its predecessors, with nothing to vary the monotony of our lives. We are still drifting north, but we see no land; and though we have had occasionally a water-sky to the northward, it seems to go before us as we advance, and we come to no result. Low temperatures and an unbroken ice-view do not seem to indicate a speedy liberation, but there is always comfort in the reflection that "we know not what a day may bring forth." I find patience to be an admirable quality under these circumstances, but I am afraid that patience long drawn out in these regions generates dullness. If we only had something to do that would be advancing the interests of the expedition, there would be some excitement in the life. Hourly meteorological observations are taken, it is true, and the ship's position daily obtained by sights, and then we have to

stop. Magnetic observations of any value are impossible, because of our ever-changing positions. Rough observations for the variations and dip are obtained, but they will serve only for convenient approximate reference, and will have no exact scientific importance. The constant change of position prevents any correct pendulum experiments from being made. No astronomical observations, except determinations of latitude and longitude, with sextant and artificial horizon, have been possible, because the erection of the observatory and the mounting of the instruments on the ice, in our situation, would have exposed them to loss should a break-up occur. Soundings are made daily, and specimens of the bottom obtained and preserved for future reference. Temperatures of the surface water are recorded every second day at the sounding hole, and that exhausts hydrography for us. At this temperature it is not practicable to add water cups and sea thermometers to our lead line, for it ices up so fast, and breaks so readily when frozen, that we might lose cups and thermometers. Natural History is well looked out for. Any animal or bird that comes near the ship does so at the peril of its life.

So far, therefore, as is possible, we do all that we can. People who have, like ourselves, been caught in the pack have been able to do no more, and in some instances not so much.

At two A. M., in a sudden squall, one of the wire stays preventing the fans of the windmill from spreading out parted, and the fans spreading out came against the tripod, bang, bang, breaking two of them short off at the hub. The stay of the other two held on, and with the wind blowing as it did, these two did all the pumping, as if nothing had happened. Fortunately the damage can be repaired without much trouble.

The carpenters have been engaged in making long runners for the keels of our large boats, in case we have to drag them over the ice in any mishap, while work still progresses on the small boiler tube-pump.

May 18*th*, *Tuesday*. — I went out this afternoon accompanied by Melville and Dunbar with a dog team, and striking the young ice about two miles N. E. of the ship, followed it to the westward as it ran for some three miles. I could have gone further, and would have done so but for my desire to get back in time for my sights at 5.30. As a specimen of Arctic scenery, the ice we met was very fine. The young ice covered an opening which was about two hundred yards in width, and in places five hundred yards. Towards the centre and along it ran a crack here and there, widening to a foot. Occasionally pools and lanes were met, the rippling of the water being a sight pleasing to the eyes after our long look at its frozen condition. On each side of this long avenue the pack of old ice stood piled up in irregular masses twenty and thirty feet in height, where great pressures had occurred. (A month ago there was no opening.) The thickest single floeberg I saw was not more than eight feet — other pieces twelve and fifteen feet in thickness, showing, upon examination, lines of strata where one had overridden the other. To the southward of the avenue, beyond the wall of ruins lining its edge, we could see a long plain several miles in extent, seemingly smooth ice, but as Mr. Dunbar had previously attempted to get to the ship by crossing it, he knew that it abounded in traps and pit-falls, where one would unexpectedly flounder and sink to his armpits. To the northward the ice was of the same hilly and broken character as the wall, and I am convinced that a sled could no more be dragged any considerable

distance in that direction (or, in fact, upon mature deliberation, in any direction), than it could be dragged across the house-tops of New York in an attempt to go to Harlem from the Battery. Whether these reflections are going on in the minds of others I do not know, for in any case they are not expressed, or any indication given of their being entertained. All our discussions, or rather conversations, for we do not discuss, include the ship as a prime factor in reducing any Arctic equation to its simplest form. Our chief difficulty of reduction lies in the fact that there are so many unknown quantities. Excellent observations today place the ship 73° 28′ 19″ N., and longitude 178° 51′ 45″ E., showing a drift of 2¼ miles N. 10° E. This is curious, because we have had an almost steady southerly wind during the preceding twenty-four hours; with easting in any change from true S., in consequence, we should have gone to the northward and westward, instead of to the northward and eastward. It may be that our field in passing along some heavier field (or, perhaps, land) has been shunted off by the resistance offered. Theory as to our movement is long since abandoned in my mind, giving way to facts based on experience. Theory may assert how we ought to drift, but our position from day to day shows how we do drift, and I accept the situation.

May 20th, Thursday. — Oh for warm weather! Only sixty tons of coal left, and the summer work yet to be done, with reference to next winter's warming, and pumping, and our cooking going on all the time. To put out all fires with the present low temperature is only to invite cold and sickness. To have come so far and accomplished nothing is very trying. If our ship were tight, all would be easier planned. But with an

injured ship I shall have to be careful how I handle her lest I jeopardize all hands. Something must be done, for we cannot rest content with a blank score; and with God's grace I will try to make some record to which I can look back with at least no regret or mortification. It is terrible to me to contemplate that the Jeannette has traveled so many thousand miles under my command only to overwhelm me with confusion at the end. How can I meet her godmother with such a meagre description of her doings!

The bright weather we are having is very cheering. An uninterrupted sunlight the whole twenty-four hours is a great treat, and would be fully appreciated if we could only avail ourselves of it in carrying the ship further N. in open water. Every day parties are out on the hunt, and I find that there is more or less complaint about soreness of the eyes. My stringent order about wearing snow-glasses whenever more than two hundred yards from the ship seems to be faithfully obeyed, and I have no doubt that their use, though not an infallible way of avoiding snow blindness, will nevertheless so mitigate the severity of the complaint as to prevent any one being laid up.

Our two invalids, Sweetman and Ah Sam, are back on duty again. By doing all the carpenter work in the deck-house, protected from exposure, I think Sweetman will not again be troubled with neuralgia. Ah Sam's complaint (intermittent fever) is an old friend of his, for it appears that he was afflicted with it in China.

May 21*st, Friday.* — Another bear. Mr. Dunbar and the two natives started off this morning on their regular visit to the traps, and finding nothing in them went on a cruise. When about five miles northward from the ship they sighted Bruin, and set the dogs on him to

hold him at bay. Getting within range they delivered a volley, all three bullets hitting and tumbling the bear over. Jumping to his feet again he singled out a dog, and, bleeding as he was, charged him fiercely; but Dunbar and Alexey again fired and finished him. The victors then brought in the skin and head attached. Having heard me say some days ago that I would like a nice head and skin for Mr. Bennett, Mr. Dunbar generously presented me his trophy for that purpose, and immediately commenced cleaning and preparing it. I design this, the most beautiful head and skin we have yet got, as a present for Mr. Bennett (if it proves acceptable to him) from Mr. Dunbar.

The windmill, being again in repair, goes to work and does all the pumping.

Took down our quarter deck awning to-day, letting in a flood of sunlight to the cabin and my room that was as pretty as a picture. At midnight a large flock of fowl, probably wild geese, flying from S. E. to N. W., crossed the stern of the ship within sight but not within range.

May 22d, Saturday. — This morning Melville and myself, accompanied by Aneguin, took a team of eighteen dogs and went out to bring in the bear killed yesterday. Upon reaching the young ice and proceeding along it for a mile, we found it had opened so much as to make us take to the rough ice for about a quarter of a mile to avoid it. Reaching the bear, we soon had him loaded on the sled and started back. So thin was the young ice, that the weight (425 pounds) of the cleaned and dressed carcass added to our weights caused the whole surface to vibrate more than once, and finally it broke under us. We had such speed on at the time that only the rear end of the sled went through, so we

escaped a ducking and the probable loss of the meat. Reaching the place in the rough ice where we had to turn off, we had a terrible time in store for us. With only the weight of the dead bear on the sled, the combined work of three men and eighteen dogs consumed an hour in getting over that quarter mile. The dogs pulled willingly enough, for they were homeward bound (and I notice that a difference of one hundred per cent. depends on that fact), and resented the delay by howling and surging at the harness until I thought the drag-rope would part. One minute the sled would be on one side of an uplifted floe piece and the dogs on the other, with a sharp ridge between. When by sheer strength we had pushed it up and over, it would plunge down the other side and stick in a hole heels up. Then we had to dig it out with our hands, and give it another start; then it would fall, one runner in a crack, and so on. Repeat these things in all shapes and varieties and they will give a faint idea. Suffice it to say, that at the end of the hour when we reached smooth ice again we were streaming with perspiration and almost exhausted.

May 23d, Sunday. — Another week has come and gone, and we are still held fast in our icy bed. Somewhere about this time last year it was that Captain Bailey, in the Rush, was blown through Behring Strait in a southeaster, and saw no ice in any direction within his horizon. We are having the southeaster again this year, but we can see no water in any direction within our horizon. The wind seems to howl viciously through our rigging, although it gets no greater velocity than twenty-one miles an hour at any time during the day, and our lead line shows a rapid drift to N. W. through twenty-seven fathoms of water.

RETURNING FROM A BEAR HUNT.

Inspected the ship at ten A. M., and then read divine service in the cabin. Otherwise the day passed without any eventful occurrence. While the wind blows so fresh, and to prevent future accident, two of the wings of the windmill have been removed, and we find that all the pumping is easily done by the two remaining. While it was undergoing repairs, the tin sails were so arranged as to be removable at will, and stay bands of flat iron were substituted for the wire rods. We have now, therefore, a more perfect and at the same time more durable machine.

May 24th, Monday. — A disagreeable discovery was made to-day, which will be more or less serious when we have ascertained a cause. Three little streams of water were found running into the shaft alley on the starboard side, just forward of where the line of the mizzen-mast would be if prolonged. The three streams if united would form a column three quarters of an inch in diameter. As no pressure has been experienced since January 19th, the date of our mishap, it is difficult to believe that it is caused by a leak, and it is rather too much water to be accounted for by the supposition that the accumulations of ice among the frames have commenced to melt. We shall have to await further developments before coming to a conclusion, and meanwhile it is one more added to my many cares and anxieties.

Observations to-day place us in latitude N. 73° 49′ 47″, longitude E. 177° 40′, a drift of nine and a half miles N. 55° W. since yesterday. We are beginning to deepen our water also, getting thirty fathoms to-day. I am somewhat in hopes that we may eventually drift past this shallow part of the ocean, and reach a depth of water which will permit a breaking-up of the ice, and insure our liberation in time to accomplish something this season.

Mr. Dunbar went out to-day to the young ice, which he found had opened so as to leave a channel one hundred yards in width. Coming back over the heavy road where we had such a hard time with the sled on Saturday, he, by great good luck, found my meerschaum pipe which I had lost in my struggles, and only missed when it was too late to look for it. The length of time I have had the pipe, the reputation which it enjoys of being the "sweetest pipe in the navy," and it being a present, made its loss an affliction, and my sentiments of gratitude to Mr. Dunbar are of the liveliest kind.

May 25th, Tuesday. — Careful observation of the leak, or whatever it is, mentioned yesterday, shows no change. The same amount of water flows, and as mysteriously as to its cause as ever. We have wind enough to drive the windmill all day, and therefore have no difficulty in getting rid of the water. I think, however, the southeaster has blown itself out.

To-day's log is headed, "One hundred and ninety miles N. W. of Herald Island." These gradual additions of a few miles each day have gone to make up quite a distance. Since the 1st of this month we have gone roughly ninety miles to the N. W., due unmistakably to the prevalence of S. W. winds, but nevertheless worthy of remark, as indicating nearly as much advance in less than a month as we accomplished during eight months previously. From this I augur good results, for since our advance was prevented during the winter, because at that time the massing and cementing together of ice brought everything to a position of rest, so also is our progress now beginning at a time when the increasing temperature will naturally bring about ruptures and disintegration.

Alexey shot and killed a young bear at the same

place (about five miles from the ship) at which our last one was killed. This is the first young bear that we have had, and we shall no doubt find his tender flesh quite a treat. The circumstances of the capture are curious. Alexey had taken out the liver of the last bear upon its capture and left it on the ice. The young bear had taken it off to some rough ice, and while holding it in his fore paws had fallen asleep, in which condition he was found and fell a prey to Alexey's rifle.

May 26th, Wednesday. — A subsidence of the winds to light airs and calms. The effect, however, has been so good that I could almost wish for a continuance of the wind; for since the noon of the 21st it has drifted us forty-two miles to N. W. (roughly). It had another effect. It has blown so much snow across the face of the floes as to cut them like a sand-blast, and has permitted the direct action of the sun on the surface, so that in the afternoon there are signs of thawing and wasting. All black substances, like ashes and refuse, sink rapidly into the ice, and are now an appreciable distance below the surface; and the white and black bulb thermometers on the port side of the ship show respectively today 70° and 72°.

May 27th, Thursday. — The boiler tube-pump is completed and in place, and it works to a charm. We have now means of pumping the ship by the windmill in all sorts of winds: from four to ten miles, by connecting the boiler tube-pump; from ten to fifteen miles, by connecting the shifted bilge-pump; and above fifteen miles with the same pump, reducing the sail surface. The whole subject reflects great credit on Melville, who designed, and Sweetman and Lee, who constructed, respectively, the wooden and iron parts. Our "windmill pumping apparatus" is worthy of being handed down to posterity.

The Baxter boiler is now used exclusively for distilling. As the temperature of the air now is at such comfortable heights, more heat is radiated in the engine-room than is needed to make the man on watch comfortable, and Melville proposes to have the coil forward on the berth deck to heat that deck instead of using a stove. The idea is an excellent one, and it only remains to be seen whether we can put it into practical execution. So anxious are we becoming on the question of fuel, that we commenced yesterday going without a fire in the cabin and berth deck from nine A. M. to five P. M., and we find that we are not so very uncomfortable. The heat remains in the cabin for several hours after the fire goes out, keeping up a temperature above 40°, and as we are always out knocking around on deck, or on the ice, where the temperature is pleasant enough in the middle of the day, we find we can very well dispense with fire until supper time.

The amount of water leaking into the shaft alley seems to have diminished, and I am more inclined to think that it (the leak) was only the melting of the ice accumulations among the frames.

May 28th, Friday. — An uneventful day. We are at a stand-still, and must wait for the development of some strong wind to shove us along again.

May 29th, Saturday. — One more day nearer the end of May, and I hope one day nearer the end of our imprisonment. A gloomy and dull day makes one moody and dispirited under these circumstances. If our latitude were only 84° instead of 74°, I don't think anybody would mind the weather, but we make a very poor showing for one season's work. However, the darkest hour is just before the dawn, and who knows how bright our dawn may be when it comes. In the

hope that we might bring her further up by the head when the ice releases the ship and permits her to float, the bower chains were unbent to-day and stowed in the lockers.

May 30th, Sunday. — By observation to-day I find we are in latitude N. 74° 5′ 27″, longitude 177° E., showing a drift since the 28th of three miles to N. 11° E. We have evidently gotten under way again, though for some reason we are prevented from going to the westward, perhaps by a heavy barrier of ice, against which our field is slowly grinding along. I have had an idea that our drift of late may be explained in some such manner; our field turning on a pivot as it advances, and eventually bringing us to its highest point, will throw us off to the eastward. The northwesting having been accomplished we are now doing our northing, and then going to N. E. will eventually be carried along E. by the current which sets E. through the Archipelago N. of the American Continent. Time will show the fallacy or the truth of this supposition; but meanwhile it affords a subject for contemplation.

The usual Sunday inspection and divine service. The high temperature being promising, I have directed that during the coming week the deck-house be taken down, the steam-cutter restowed, and the sleds dismounted. Our new arrangements for summer will be mentioned later on.

A very gratifying reduction in the coal expenditure has resulted from our doing partially without fire.

May 31st, Monday. — The last day of spring, and then we shall have summer before us. Let us hope that with spring may end all trials and tribulations, and that we shall now start forward to the accomplishment of some purpose. Our observations to-day are encour-

aging, for we are four miles north of yesterday, showing a tendency to go east a little, while going north more. The carpenters finished the keel runners for the boats, and Lee made bolts for them for securing.

After all we have no reason to complain of our progress during the past month. Our total drift has amounted to one hundred miles, and we have made good eighty-two miles to N. 38° W. Our average temperature has been 18.46°, and though we have had it as low as minus 8.5°, we have on the other hand had it as high as 35°.

CHAPTER IX.

A FROZEN SUMMER.

June — August, 1880.

Which Way does the Ice go? — Appearance of Insanity. — A Fall of Rain. — Danenhower's Case. — Bad Walking. — Mosquitoes. — A Day's Record. — Lanes of Water. — The First Punishment. — Stoppage of the Leak. — Melting of the Surrounding Ice. — The Ship in an Island of Ice. — Thickness of Ice. — Punishment of Dogs. — Irksomeness of Confinement. — Accident to Alexey. — The Height of Summer and the Depth of Discouragement. — The Resolution of the Company. — Fog and its Effect on Ice. — Speculations on Arctic Ice. — Studies of Sea-Water Ice. — Tests applied. — Sudden Encounter with a Bear. — Getting at the Propeller. — A Party of Bears. — Crimson Snow. — A Hopeless Outlook.

JUNE 1*st*, *Tuesday*. — The first day of summer — and a gloomy and disagreeable one at that. Occasional thick fog prevailed, and a frequent fall of light snow added to the general cheerfulness! Sounded at noon in thirty-three and one half fathoms, muddy bottom of course, and the lead line showed a drift to N. N. W. Commenced hauling the dredge again, obtaining this time a few shells and shrimps.

June 2d, Wednesday. — A lovely summer day! A gale of wind and a snow-storm. This gale must have been severe on the edge of the floe, wherever it may be, for as the ice exerts a deadening effect on the wind, we did not have, of course, the full weight of it. The snow was driven in clouds almost horizontally. It was,

however, very soft and mushy, melting almost as soon as it fell, so our water supply will not be benefited.

Although the surface of our floe is soft and mushy, and we can see it waste away, and though the water is all around our ditch, we seem to be no nearer liberation. The ice at the sounding hole is yet forty-eight inches thick, and the body of the ship seems to be held firmly by ice which does not thaw, with such a layer of water on top of it as our ditch shows. That waste does occur to the surface of the floe is evident, not only from the sinking of ashes and dirt, but from the appearance again on the surface of objects which were long since buried. This seems to afford the dogs great satisfaction, for they occasionally unearth things which they buried months ago, and thus lost, which they now find to enjoy to their hearts' content.

June 3d, Thursday. — The gale has blown itself out, leaving us generally clear and pleasant weather. Since May 31st we have advanced only nine miles to N. 27° E., or about three miles a day. Evidently the ice to the northward of us has no tendency to give way as yet, and we accordingly have cushioned off to the eastward. Now it is a very interesting problem (and we may have the good fortune to solve it) which way this ice goes, whether east or west, in the course of its path to an outlet. That it does not steadily set south and find an outlet through Behring Strait is proved by our drift N. W., and the fact that but little ice comparatively is met in Behring Sea in spring and none in summer. That it is not wasted entirely by solar heat is also evident. If it did not go somewhere, the accumulation of years would by this time have closed the Strait altogether. That it goes north is doubtful, because, probably, north of the 85th parallel the ice never breaks up

enough to permit navigation. Hence it must go either east or west. To go east is in accordance with the earth's rotation and complies with theory, while in fact the Resolute drifted east through Barrow Strait out into Davis Strait. To go west is contrary to hypotheses based on the rotation of the earth and the supposed direction of equatorial currents; but we have gone N. W. by the prolonged action and force of S. E. winds. Therefore the wind may overpower the attraction of rotation, and set the ice in this ocean so far to the westward as to bring it within the influence of the Polar current about Spitzbergen, and discharge it thus into the Atlantic. Or we may in time, in accordance with my theory, pass from the region of S. E. winds to a region of N. W. winds, when, from their prevalence, they have generated an easterly set, which, encouraged as it were and accelerated by the motion of rotation above referred to, may carry the ice to the eastward through the Archipelago, and cause it to mingle with the Polar current known to be setting south through Smith Sound and Davis Strait, and so on to the Atlantic. As to there being any warm current reaching to a high latitude, I very much doubt. We have found none; and I am inclined to agree with Lieutenant Weyprecht when he says, "The Gulf Stream does not regulate the limits of the ice, but the ice, set in motion by winds, regulates the limits of the warmer Gulf Stream water, depriving the same of the last degrees of heat which it contains;" and I pronounce a thermometric gate-way to the Pole a delusion and a snare. Of course if any warm current came through Behring Strait it would be the Kuro Siwo, and our sea temperatures indicated no such fact.

June 4th, Friday. — A very unpleasant report was

made to me by the doctor, namely, that Nelse Iversen, coal-heaver, was trembling on the border of insanity: this was as unexpected as it was astounding. The man all along had been bright and cheerful, and disposed to be active in his habits as well as attentive to his duty. For a day or two he has received medicine for constipation, and in his conversations with the doctor betrayed more nervousness and anxiety and general disquiet than such a disorder should have given rise to. This morning, however, on presenting himself at nine o'clock, he was very hysterical and nervous, informing the doctor in all seriousness that he was being watched, and that a mutiny was on foot among the men; that he had been approached on the subject, and asked what he would do in such a case, etc. Being closely plied with questions he burst into tears and became quite incoherent, going on with all sorts of rigmarole. He mentioned Sharvell, another coal-heaver, as one who had approached him on the subject of mutiny. This Sharvell is a mere lad, who would no more be suspected by me or any one else in the ship than a child. This is a serious case, and I can but hope that time will alleviate the disorder. But at best Iversen will always be more or less doubtful, and, of course, utterly unfit for any responsibility. First a blind officer, and now a crazy man — these will be serious charges on my mind in any emergencies. Observations to-day reveal the unpleasant fact that we are going backward, showing a drift of three miles to S. 34° E. This is not at all pleasant. Motion onward was pleasant enough, but we cannot say the same for motion backward.

At work all day in stowing away against the bulwark the deck-house planking and frame, in rearranging our deck load of provisions, in unpacking our sleds,

stowing the provisions and dog food they contained in the steam-cutter, and in general cleaning up around ship. We are gradually resuming ship-shape proportions, and shall soon be ready for a start northward and eastward, or northward and westward, whichever the ice and winds will permit, for, alas, our coal-pile is too small to think of doing any steaming except in a great emergency.

The thermometer beginning at 25° reaches 37° by six P. M. and closes at 30°. Very pleasant and agreeable, thus enabling us to be indifferent to having no fire in the stove.

June 5th, Saturday. — A day of no remarkable event, except that my observations for position reveal the unpleasant fact that we have been set back S. one half W. four and a half miles. This is due, of course, to the northerly winds prevailing during the preceding twenty-four hours. Some little encouragement can be drawn from the belief that our prompt changes of position, in compliance with change of wind, indicate a generally looser state of the ice than has been supposed hitherto. I am hoping strongly day after day for some indication of a coming liberation, but though we have nearly daily a tempting water-sky in some direction or other, no change yet comes. Chipp has his hands full in getting things into shape, but everything is progressing favorably, our decks are rapidly clearing, and we are surely approaching the time when nothing will remain but to hang the rudder and make sail when the ice gives us a chance to head toward some satisfactory result of our Arctic cruise.

June 6th, Sunday. — In my sanguine moments during the winter I used to hope for a liberation and consequent advance in May, but here we are in June and

everything frozen as hard as ever. However, *Nil desperandum!*

At ten A. M., just as we were going to call all hands to muster, a fall of rain compelled us to wait. It was a pleasure to see it, and a positive luxury to hear it pattering on the poop over our heads. It lasted but a few moments, unfortunately for us, because rain will do an immense amount toward thinning out the ice.

I inspected the ship, however, as usual, and found everything wonderfully neat and trim. We are quite clear enough to work the ship, as far as the spar deck is concerned; and it will be a subject for experiment whether, when she floats again, her trim so much by the stern will let her be handled under sail.

At one we had the general muster and read the Articles of War, and following this I read divine service in the cabin. We are almost down to our minimum expenditure of coal, — 1,425 pounds for the past week.

June 7th, Monday. — To-day our observations for position have produced a somewhat discouraging effect upon me. The wind having prevailed from the northward and westward, I was prepared for, and anticipated, being set to the southward and eastward, perhaps S. E.; but to my disgust my sights (latitude 74° 4′ 37″ N., longitude 177° 27′ E.) showed that we have been set seven and three quarters miles to S. seven degrees W. Seven and three quarters miles of our hard fought drift gone in a day. Had we gone east I would not have minded it, for we always have something in that direction; but to go any further to the westward seems like trying to walk through a stone fence. There is plenty of water-sky around us, too, as if to tempt us with a sight of the impossible. As the wind still continues from the northward and westward, we must expect

more southing by to-morrow; but it will be doubly hard if we make westing again, because it will seem then that we have got a start for the coast of Siberia, and there is nothing of honor in that. Never mind, "The darkest hour is just before the dawn," and our dawn may be a bright one.

The men were busy to-day scraping the ship's side in readiness for painting. Surrounded as we are with ice, we nevertheless shall make a good appearance. Chipp already has the Jeannette clean and orderly, and will have her in fine cruising order by the time the water gets to us. Sweetman was at work securing the keel runners to the boats, while Nindemann varnished the binnacles and fitted "pantalets" to them.

To-day we discontinued fires in the cabin and berth deck, intending hereafter to limit our expenditure of fuel to what is required in the galley and for distilling. At first, no doubt, we shall feel the cold; but a slight discomfort now will weigh as nothing against accomplishing something this summer, or being comfortable next winter. It is well to notice here, that now that we have no fires in the stoves we boil our tea water by steam, using a pipe Melville has fitted to the Baxter boiler for that purpose.

June 8th, Tuesday. — Still going south and east. I suppose we shall go in this direction until a southeaster brings us up and sends us northwest.

June 9th, Wednesday. — Still going south, — one mile to S. 12° E. since yesterday. However, that is a slight affair, and hardly worth mention, for a promising feature developed itself in the shape of another S. E. wind, which, springing up at six A.M., freshens, and by midnight reaches a velocity of eighteen miles, with indications of growing still fresher to-morrow. The ther-

mometer begins at 19.3°, gets as high as 27.7°, and closes at 22°, — rather low to be without fires, but we do not mind it, at least most of us do not.

June 10*th*, *Thursday*. — A gloomy, disagreeable day; no observations possible; in fine, nothing to do but remain shut up, thinking how lovely June is in these regions, and how dull and dreary this confinement has become. Over nine months held in bondage. Thus far in the month our prospect is not very promising. If we are to judge of the future by the past, very little can be said that is favorable; but fortunately experience of others in other Arctic wastes has demonstrated how quickly changes take place, and how little can be judged of the morrow by to-day.

June 11*th*, *Friday*. — Another day of gloomy, unpleasant weather, a drift to N. N. E. being indicated by the lead line. A drift this way is a welcome change to our going backward. Thick fog or impenetrable snow falls so soft that it melts on touching the floe, thus depriving us of the satisfaction of getting drinking water from it, whereby we might put our distiller out of commission and save one hundred pounds of coal a day.

June 12*th*, *Saturday*. — These are, I think, our gloomiest days, not alone because of the unpleasant weather, but because of the continued disappointment, hour after hour, at a time when we have some reason to hope for a release. Before many days the sun will have got his furthest north, and will commence going south again, and that in itself is not a comforting circumstance. Though the ice is visibly wasting on the surface, and is sloppy and in places ankle deep in water, there is enough that is firm and solid below to hold us fast, and prevent lanes or openings. This chasséeing around

before varying winds will perhaps bring us up near where we started, but it may also have the effect of shaking up the ice and cracking it, in which case the present temperature will prevent a re-freezing, and perhaps facilitate the making of a lane by which we can move.

June 13th, Sunday. — The general gloominess is somewhat alleviated by the getting of observations for position, whereby I determine we are in latitude 74° 3′ 46″ N., longitude 176° 53′ 45″ E., and have drifted since the 9th instant thirteen miles to N. 69° W. Not encouraging, either for the Pole or the N. W. Passage; but *quien sabe?*

At ten inspected the ship, finding everything neat, clean, and orderly. Divine service followed. Jack captured a young fox. Turned it over to naturalist.

June 14th, Monday. — Mr. Collins was added to our sick-list last evening, — an attack of indigestion, or something of that kind, which is not serious enough for alarm. Danenhower's case remains the same, and the doctor tells me nothing more can be done for him until our return to the United States. To bring about any change in his condition a very severe operation is necessary, and in our circumstances such an operation is not to be resorted to. Besides proper instruments, the surgeon ought to have an assistant, and the subsequent treatment of the patient requires the conveniences and appliances which a hospital alone can furnish. So far as the purposes of this expedition are concerned, Danenhower may be counted out entirely; and my plans and operations are therefore to be made without his assistance or coöperation.

All sorts of weather to-day, — sometimes a little blue sky, oftener overcast, a little fog, a little snow, and

some squalls. We are engaged in painting the ship outside, a curious spectacle in the ice-pack, and shall look as neat and trim ere long as if we were at anchor in a snug harbor. Our boats are also being painted, getting their share of the general "tarring" up.

June 15*th, Tuesday.* — Much water-sky all around horizon, and from aloft we can see ponds here and there at long intervals.

June 16*th, Wednesday.* — Observations to-day place us in 73° 40′ 54″ N., and 177° 18′ 15″ E., showing that we have drifted since yesterday thirteen miles to S. 18° E. This is the hardest blow of all, and difficult to stand up under. Are we never to have a change? Our soundings to-day are in twenty-five fathoms, so I suppose we are drifting towards some shoal on which our ice-field may bring up. I am too disgusted to make any more remarks on such a miserably resulting day.

June 17*th, Thursday.* — Observations to-day place us in 73° 33′ 41″ N., and 177° 27′ 15″ E., showing a drift since yesterday of 7.7 miles to S. 21° E.

The work of painting goes on as if we were in a harbor with other ships to look at us, instead of being hard fast in the ice many hundred miles away from the rest of humanity. At all events we can admire the result of our own labor.

June 18*th, Friday.* — Our daily monotony is very depressing. Over nine months have we been held fast and drifted here and there at the will of the winds. So long as the temperature gave no chance for a change, no one expected it, and we cheerfully accepted the inevitable. When during the month of May we steadily drifted to the northward and westward we were nearly as well pleased as if we had had a lane to move the ship along in, for we were advancing. Since the 4th

instant, however, we have been as steadily going back, and to-day we are very nearly in the same latitude we reached a month ago, and about fifteen miles W. of our old track, going on "backward in our flight." Here then, so far as we can judge, is a month lost, and worse than lost, for we have got into shallower water where but little wave action can or will take place to break up the field which surrounds us. Water-sky in abundance indicates some ponds, if no larger opening; though as they change positions daily, no very considerable opening can have occurred. In our immediate vicinity where the water pumped from the ship froze over the old ice, the crust is thawing and forming ponds. This makes our walking uncertain, for without warning one is apt to break through and be in water over his knees. As all around the ship ashes and refuse have been spread, presenting a black surface, the ice underneath rapidly melts, and by the careful attentions of Melville, Dunbar, and the doctor, the resulting water is led by canals to the ditch, where, by its warmth, say 30°, it honey-combs the heavier ice beneath. By the wasting of the ice the ship is more uncovered, and within a day or two we have noticed that she has come up, "cradle and all," about four inches, as indicated by the falling of the water-level on her doubling. Every day Mr. Dunbar and the men are out on the hunt, and occasionally a seal is brought in, in tow of the dogs, as the result. All bears seem to have disappeared, not a single track having been seen for some days. They evidently have gone to the land, where the breeding season affords them more attractive food than seal meat at rare intervals.

June 19*th*, *Saturday*. — Observations to-day show a drift to S. 47° E. seven miles. That our drift is not

greater is remarkable, for, in the past twenty-four hours we have had N. W. winds, with velocities ranging from sixteen to twenty-four miles an hour. However, our field may have brought up, and though we are deepening our water again to twenty-three and a half fathoms, it may be that we are being edged off, as the ice grinds on the shoal. Otherwise the day is without interest. Puffy, squally weather and occasional snow flurries go to make up a June day in these latitudes.

June 20th, Sunday. — Another week has come and gone and we are in the same place. Instead of repining at not advancing, I suppose I ought to be grateful that I have a ship to hold us together, but weak human nature crops out occasionally.

At ten I inspected the ship, finding everything in good condition, and shining with the coat of paint that has been applied. Then divine service was performed in the cabin. Newcomb, while out to-day, found a dozen mosquitoes. Carefully did he bring them to the ship as trophies. They were, when found on the snow, dull and sluggish, as if blown a long distance by the wind.

June 21st, Monday. — The advent and departure of another day to record; and except that it is the longest day in the year to some people (though not of course to us, since we have the sun the whole twenty-four hours), it is hardly worth recording. Observations show us that we have drifted, since the 19th, eleven and three tenths miles to S. 68° E. Discouraging, very. And yet my motto is, "Hope on, hope ever." A very good one it is when one's surroundings are more natural than ours; but situated as we are it is better in the abstract than in realization. There can be no greater wear and tear on a man's mind and patience than this life in

the pack. The absolute monotony; the unchanging round of hours; the awakening to the same things and the same conditions that one saw just before losing one's self in sleep; the same faces; the same dogs; the same ice; the same conviction that to-morrow will be exactly the same as to-day, if not more disagreeable; the absolute impotence to do anything, to go anywhere, or to change one's situation an iota; the realization that food is being consumed and fuel burned with no valuable result, beyond sustaining life; the knowledge that nothing has been accomplished thus far to save this expedition from being denominated an utter failure; all these things crowd in with irresistible force on my reasoning powers each night as I sit down to reflect upon the events of the day, and but for some still small voice within me that tells me this can hardly be the ending of all my labor and zeal, I should be tempted to despair.

All our books are read, our stories related; our games of chess, cards, and checkers long since discontinued. When we assemble in the morning at breakfast we make daily a fresh start. Any dreams, amusing or peculiar, are related and laughed over. Theories as to whether we shall eventually drift N. E. or N. W. are brought forward and discussed. Seals' livers as a change of diet are pronounced a success. The temperature of the morning watch is inquired into, the direction and velocity of the wind, and if it is snowing (as it generally is) we call it a "fine summer day." After breakfast we smoke. Chipp gets a sounding and announces a drift E. S. E. or S. E., as the case may be. We growl thereat. Dunbar and Alexey go off for seals with as many dogs as do not run away from them *en route*. The doctor examines Danenhower and Iver-

sen, his two chronic patients. Melville draws a little for this journal, sings a little, and stirs everybody up to a realization that it is daytime. Danenhower talks incessantly — on any or all subjects, with or without an audience. The doctor moralizes between observations; I smoke; Mr. Newcomb makes his preparations for dredging specimens; Mr. Collins has not appeared, his usual hour being 12.30 in the afternoon. Meanwhile, the men have been set at work; a sled and dogs are dispatched for the day's snow for washing purposes. The decks are cleared up, soundings made, berth deck inspected, and work of painting, scraping, or whatever is on hand commenced. The day's rations are served out to the cook, and then we commence to drift out on the ice to dig ditches, to look at the dogs, calculate the waste in the ice since yesterday, and the probable amount by to-morrow. The dredge is lowered and hauled. I get the sun at meridian, and we go to dinner. After dinner more smoke, more drawing, more singing, more talk, more ditch and canal-making, more hunting, more work, more dog inspection, and some attempts at napping until four P. M., when we are all around for anything that may turn up. At 5.30 time and azimuth sight, post position in cabin, make chart, go to supper at six, and discuss our drift, and then smoke, talk, and general kill-time occupations until ten P. M., when the day is ended. The noise subsides; those who can, go to bed; I write the log and my journal, make the observations for meteorology until midnight. Mr. Collins succeeds me four hours, Chipp him four hours, the doctor next four hours, Mr. Collins next six hours, I next two hours, Melville next two hours, and I end the day again, and so it goes.

Our meals necessarily have a sameness. Canned

meats, salt beef, salt pork, and bear meat have the same taste at one time as another. Each day has its bill of fare, but after varying it every day for a week we have, of course, to commence over again. Consequently we have it by heart, and know what we are going to eat before we sit down at table. Sometimes the steward startles us with a potato salad (potatoes now rotting too fast for our consumption), or a seal's liver, or a bear's tongue; but we generally are not disturbed in that way. Our bill of fare is ample and good, our water is absolutely pure, and our fresh bread is something marvelous. Though disappointed day after day we are cheerful and healthy, and — here we are.

Everything looks unsettled about the weather to-day. We have some squalls, a little rain, a little snow, a little mist, plenty of water-sky, and, alas, plenty of ice. The temperature ranges between 33° and 30°.

June 22*d*, *Tuesday*. — As a finishing touch to our cleaning house we to-day blacked down the rigging. Mr. Newcomb shot and secured a beautiful Ross gull, which from its rarity is quite a prize. This makes the third of this species that he has secured, two last fall and one to-day.

June 23*d*, *Wednesday*. — Ross gulls are by no means rare with us, however rare they may be in other parts of the world, for to-day Aneguin shot another one and brought him in, making four in our collection. Our bear meat beginning to run low, we have set to work accumulating seals, not only for the dogs but for our own possible food, and I am much pleased to find that we have now twenty-seven on hand. Every day hunting parties are out bringing in one or two. Thus far we bury the seals in the snow to preserve them from the heat (?) of the sun, which will, of course, last

only as long as we are held fast. When we move, I suppose we must utilize some empty space in the coal bunkers as a stow place for the carcasses. For some reason we see no walruses. The amount of bright sunlight we have had since the temperature has been pleasant has not been sufficient, perhaps, to induce the walruses to come out and bask in it. This month has been an eminently unpleasant one, for though the temperature has been comparatively high, say 32°, so much moisture has been contained in the air as to make us always chilly. The thawing on the surface of the floe has kept everything sloppy, some places being an inch deep and more in water. Under such circumstances moccasins are of no use; rubber boots for steady wear are crippling to the feet, and we are compelled to fall back upon leather boots, which, though kept impervious to water by constant greasing, make our feet cold and uncomfortable. My plan is to wear my boots only when in the main cabin or on the ice; as soon as I come into my own room I put on a pair of bird-skin slippers which Mr. Dunbar made for me, and which are as warm as can be desired.

Owing to the accumulation of ashes and rubbish around the ship, the ice in that locality is rapidly wasting, and in consequence more and more of the ship's hull is being uncovered. Besides this there is a wasting going on in the ice-cradle which holds her, and this relief of so much weight allows her to rise more nearly to her proper flotation. This we see indicated by the daily difference of the water-level, and it averages nearly an inch a day. In an idle moment I appointed the 4th of July, the anniversary of the Jeannette's christening, as the time when she would again be afloat and under way, and I shall be the happiest man north

of the Arctic Circle if such proves the case. Since our supply of snow begins to be difficult of access on account of the sloppy condition of the ice which makes sledding bad, we to-day filled our tank on the spar deck with the water from the pools. The temperature is sufficient to prevent accident to our tank by any freezing.

The dismal monotony of our daily existence still continues, and while our drift is southward ho! our social barometer is kept correspondingly low. The only animate creatures in whom I detect no change are the dogs. They seem perfectly oblivious to all surroundings, utterly indifferent whether the sun shines or does not shine, so long as they are fed. From the liberal diet of bear meat and seals' entrails they have remained as fat as dumplings, and repudiate utterly any labor or exertion. When with the sunshine the temperature reaches 32°, it is amusing to see them pant, and seek shady places, while we human beings are merely comfortable. However, their heat has a better non-conductor than ours.

June 24th, Thursday. — A day without anything in particular to record.

June 25th, Friday. — This day is worthy of record as bringing another Ross gull, shot by Aneguin, and no less than nine seals. Besides this Aneguin saw and shot his last cartridge into a young bear, but the animal, though bleeding freely, took to the water and escaped. The "water" referred to is the long lane about one and a half miles S. E. of the ship, which is daily visited by seal hunters. Thermometer is generally at 31° and 32°, but at three P. M. it was 37.5°. Oh, if we could have it at 100° for a week to melt this ice rapidly! That some melting is going on beneath is

shown by the water-level going steadily down on the ship's side, the weight holding her down becoming less. We now have the sea-level at nine feet seven and a half inches forward.

June 26th, Saturday. — A drift of eight miles N. 85° W. Thus it goes, east one day, west the next, north one week, south the next. When will this come to an end? Twenty-four fathoms soundings, W. S. W. drift, also encouraging, very! An opening ten feet wide occurred in the ice half way to the old opening one and a half miles S. E. of the ship. Much water-sky in all directions.

June 27th, Sunday. — At ten A. M. made my usual Sunday inspection, and read divine service thereafter in the cabin. From the crow's-nest we can see that we are in the centre of an ice island, a lane of water in some places a quarter of a mile wide surrounding us at a distance of a mile. This would show that the ice does sometimes open in these latitudes, a fact which I had begun to doubt hitherto.

June 28th, Monday. — Mr. Dunbar started out this morning with the dingy to go ducking, intending to go to the lane of water about one mile N. W. of us, and try luck. He came back about four P. M. with thirteen ducks, and informed me that he followed the lane (which he thought ran north) for nearly fifteen miles without coming to its end. The ice on each side (at times two thirds of a mile wide) was very old and heavy, five and six feet out of water, and so deep under water that he could not see the bottom of it. I began to look upon this as an avenue of escape, and ran over in my mind how I could get the ship through the mile of intervening ice into the lane and push on for something. But I need not have exercised my slumbering brain

tissue, for toward midnight the lane commenced to close, and I had the melancholy satisfaction of realizing that had the ship been there she would in all probability have had a fine squeezing.

We find that the amount of water coming into the ship forward is decreasing quite sensibly, for we do not have to run our windmill nearly as much as formerly. The leak, or supposed leak aft, has stopped altogether. The ice right around us is wasting very fast, and we still continue to rise, bringing our cradle with us. To-day the water-line is at nine feet four inches on our stem. We are heeling 4° to starboard (3° all winter), and our doubling on the starboard side is about four inches above the water. The surface of our floe is dotted here and there with small lakes, which enable us to get water readily for our tank, and present so many excellent laundries for washing clothes. How disgusting it is to see ice form on the surface of our little lakes at the end of June.

June 29th, Tuesday. — An uneventful day. We have drifted since yesterday three miles to S. 31° E. Not very encouraging, but still I hope on, hope ever. The lane of open water which Mr. Dunbar followed up for fifteen miles yesterday has closed again to-day, its general direction being indicated by disconnected small ponds here and there. The ship is still rising, the water-level being now at nine feet on the stem.

June 30th, Wednesday. — The month of June comes to an end, and leaves us, I am sorry to say, fifty miles S. 9° E. of where we were at its commencement. We are, in fact, no further north than we were between May 16th and 17th, and may be said to have accomplished nothing in six weeks — both cheerful and encouraging! Our position to-day is in 72° 19′ 41″ N., and 178° 27′ 30″

E., and we have gone since yesterday S. 52° E. the enormous distance of one mile! I am almost disgusted beyond redemption. To stand still would be bad enough, but to go backward is worse. To-day I had to inflict the first punishment of the cruise on Boyd, fireman, giving him watch and watch for twenty-four hours in the fire-room, for profane and abusive language to a shipmate. A magnificent day for weather, — a temperature of 41° at two P. M., and 34° at midnight. Not a cloud from noon to midnight. Mr. Dunbar took the dingy out to the long lead to-day, but found it all closed up. No ducks, therefore, were brought back, but a Ross gull, which, though quite rare in Europe and America, is with us a drug almost, for we have seven.

July 1st, Thursday. — We commenced a new month with bright, pleasant weather, and almost cloudless sky, light southerly wind, and a temperature ranging from 33° to 38°. And as an encouraging fact, our sights show that we have drifted since yesterday two miles to N. 40° E. Let us hope that it is the beginning of a new era, and that we are now going to advance and no longer retreat. Nearly ten months held fast in the ice, but yet we are all here, and with two exceptions in good health. Danenhower drags along in as uncertain a condition as ever. Of late his eye has been accumulating trouble and begun to affect its mate, and the doctor has been compelled to cut and probe again daily as he did early in the winter. Though Danenhower stands the trial well, as far as his general health is concerned, I fear he may not be able to stand the wear and tear of another winter in the pack if we are unfortunate enough to have to endure it. He is, of course, very thin and bleached from his long confinement, but seems always bright and cheerful, and speaks of getting back to duty

in a short time, which, of course, I know to be out of the question. Our other sick man, Iversen, seems to be improving, only occasionally breaking out into hysterical weeping, etc.; but his gloomy ideas of being watched and a mutiny, etc., seem to have subsided.

Our coal account shows that we have remaining fifty-six and one half tons. At all hazards I must retain thirty tons for keeping us warm and cooking and distilling next winter, so that I have just twenty-six tons that could be devoted to steaming in case I had a fair chance to accomplish anything. As our consumption per diem in steaming would be at least five tons, I have in round numbers five days' steaming. And with this I have to make the Pole, accomplish the N. W. Passage, or go back empty handed. What an ending the last would be compared with our beginning, — the yachts, the fort's salute, etc., etc. It makes my heart sick to think of it. What a return for the expenditure of money! What a realization of all my fond dreams and hopes!

To-day our men dug away the ice under and around our propeller well, hoping for a time soon to come when we can get the screw up and have a look at it. We still rise slowly, but there is yet a large mass clinging to us. Melville tried the other day to turn the screw shaft by jacking, but it was held too rigidly.

July 2d, Friday. — Another uneventful day, and such gloriously beautiful weather that our enforced idleness becomes terrible. A temperature ranging from 34° to 46.4° and back to 32°, and ponds here and there to mock us with water that is too little for navigation and too salt for drinking — at all these we stand and look, and see one day more pass by without our having done a thing that is to our credit.

July 3d, Saturday. — The amount of water finding its way into the fore peak has become very small, and within the last week or two just a small stream running over the floors. But to-day even that small amount has ceased, and the fore peak and flour-room are both as dry as a bone. The amount of water lodging in the fire-room bilge is correspondingly small. We have been accustomed to let about five inches accumulate, in order to have a convenient feed for our distilling apparatus, running the windmill, or pumping by hand, when that depth has been increased. The light airs and calms of the past day or two have necessitated the use of the quarter deck bilge-pump, and I have remarked that a dozen strokes or so each hour have caused it to "suck." The melting of the surface ice around us has so much decreased the mass of ice surrounding the ship that it has been buoyed up by the water bringing the ship with it, and to-day the water-level is at a height, or perhaps more properly depth, of eight feet seven inches on our stem.

The decrease of the leak is pleasant enough, though of course I can assign no satisfactory reason. The change from 3,663 gallons per hour to a dozen strokes of a hand bilge-pump is too remarkable to be mentioned casually. The change has been gradual, and inexplicable beyond a certain extent. The settling down and hardening of the oatmeal, white lead, oakum, etc., between the frames may have caused a partial barrier to the entrance of the water, and the raising of the ship and ice out of the water, and so diminishing the height of the water head, may have so decreased the pressure as to make that barrier effectual. As no water flows into the fore peak, this seems to follow naturally, and the small accumulation in the fire-room may proceed

from some other source yet undiscovered. Small as it is, it will not occasion us much uneasiness. I am unable to get under the coal bunkers, because of the fifty-six odd tons of coal there remaining, and the impracticability of attempting to remove it while I am daily hoping for a breaking up of the ice and a resumption of our voyage.

We have dug away all the ice we could get at under the stern, in the hope of liberating our screw in order to trice it up for examination. But enough ice remains under water to hold it firmly. Leaning 3° or 4° to starboard, the port side of our ship looms up like a frigate, and at a little distance we stand, seemingly, on top of the ice. Drawing but eight feet seven inches forward, and twelve feet aft, gives us a very "down at heel" look, and makes me wonder what we shall really draw when the ice-cradle breaks up under us and lets us down to our line of flotation.

Our daily expenditure of fuel amounts to one hundred and seventy pounds. (One hundred and ten pounds for the galley and sixty for distilling.) I am very much in hope that the distilling may soon be discontinued; for the doctor, who has been carefully watching and experimenting with the melting ice hummocks and the ponds, informs me to-day that, though the ponds are too salt for use, the surfaces of the hummocks give water containing only two grains of chlorine. Accordingly on Monday we shall commence collecting surface ice in barrels, thawing the same and testing the resulting water, and accumulate a tankful if possible, thus relieving the distiller, and saving sixty pounds coal per diem.

The little ponds in our neighborhood have been freezing every night at midnight with the thermometer at

30° and 31°, thus indicating the comparative freshness of their waters. In the daytime our dogs drink freely from these ponds, and our men use them as convenient washing-places for clothes. To-day an amusing sight was presented by a wash-tub, wash-board and all, on the ice, and the nautical performer as earnestly engaged in his laundry as if no such thing as ice or a ship was within a thousand miles.

To-day we ate the last of our bear meat, that good and solid addition to our food during the many months we have been in the ice. Having upward of forty seals, we shall now occasionally fall back on them for a change in our bill of fare. Yesterday we had ducks for dinner in the cabin, the result of Mr. Dunbar's hunt the other day; to-day we had bear fore and aft, and to-morrow all hands will try seal. Our position to-day is in latitude 73° 24′ 13″ N., and longitude 178° 34′ E., having drifted since yesterday the stupendous distance of one and four tenths miles N. 27° W. Anything, however, so long as it is not south. Weather bright and pleasant; brilliant sunshine for the whole twenty-four hours makes me deplore our inability to devote it to accomplishing some good and useful purpose.

July 4th, Sunday. — In reality this is Monday, July 5th, because we have crossed the 180th meridian, and should have changed our date; but as I hope to get east again this summer, I have seen fit to keep the old reckoning. A year ago to-day we were in San Francisco, and received a visit from Lord Loftus, while on his way to Sydney, as Governor of New South Wales. At dinner to-day we recalled that event. Ah, well! who can tell what a year will bring forth. We certainly have not realized our anticipations by long odds; and I see in the faces round about me no hope of so doing.

Stuck in the ice — mired, in fact, at 73° 24′ N., it is hard to hope that we shall make any record worth comparing with any other. Being the first Sunday in the month, we had, of course, the Articles of War and general muster preceding my inspection and divine service.

July 5th, Monday. — Celebrated the anniversary of American Independence by dressing ship with ensigns at mast-heads, and signals in a rainbow; and I hope American Independence will feel sufficiently complimented by its celebration in this place for the first time. The weather prevented me from determining the exact spot of the celebration by observations. The latitude, 73° 26′ 7″ N., is all I could get. Thick fog and a searching mist made a wretched day. The flags were all covered with rime and frost when hauled down, and will need several days' good sunning to be dried.

July 6th, Tuesday. — All our time and attention were occupied to-day in collecting surface ice and thawing the same in our water tank for drinking and cooking purposes. The greatest care was exercised in the selection of the ice; but occasionally some would prove to have been dug too deeply, and would give so much salt in its resulting fluid as to require rejection. As a general rule, the soft snow-like surface crust was sufficiently fresh to make a potable element; but if by accident or carelessness the spade struck into the underlying ice, a salty solution was the result. Dr. Ambler and Chipp watched the matter closely and faithfully, repeated tests being made of each barrelful of snow before emptying it into the tank; and I am satisfied that every precaution was taken to provide a sufficiently pure element. The change from distilled water to melted ice is a bold experiment, and only warranted by

our zeal to save every pound of coal we can for possible steaming this summer, or keeping us warm next winter. To quicken the process of thawing, a steam-pipe was led from the steam-cutter's boiler into the tank on the spar deck, and the steam driven into the tank through it. As our tank holds four hundred gallons, I am anxious to accumulate that quantity rapidly, and shut down on all consumption of fuel, except for the galley, as speedily as possible. Parties going out to hunt return with the news that the ship is in the centre of an island of ice about two and one half miles in diameter, with a narrow canal running around it.

July 7th, Wednesday. — We succeeded in getting our tank filled to-day with a sufficiently pure water from melted surface ice, and I accordingly directed the distilling to be stopped. Thus we save sixty pounds of coal per diem, and give a rest to our engineer's department, which has been steadily employed in night and day watches all the winter and spring; in fact, upon the firemen and coal-heavers has fallen most of the uncomfortable toil, for whether in distilling, or running steam-pumps, or repairing, they have not had an all-night in since November.

Such little pumping as is required, about a dozen strokes every two hours, is done by the man on watch for the time being, and we have now little beyond the ship's routine, except watching and waiting for an opening in the ice that will let us free.

Nowhere in my life have I experienced or felt such a perfect silence as prevails in these icy wastes when the wind dies away. It is positively maddening. After ten P. M., when all noise ceases on board ship, and the dogs are dozing away on ash heaps and dirty spots around her, one standing a little distance apart and

looking at the surroundings would feel inclined to believe that no life existed but his own. On such occasions I go a little distance off and ruminate over our past, and wonder as to our future ; but to-night the silence was so painful as to easily induce me to go back to the cabin where my own kind could be seen and their voices heard.

The running of the water over the floes in long lanes has made regular sluice ways through which the meltings run to find the sea-level. Our old sounding hole, about one hundred yards on the starboard quarter, offers an access to the sea, and several streams have scoured a way or had a way made for them. This running water has wasted the ice away until at the edges of the hole it is but two feet thick, and covered with six inches of water swirling about like a maelstrom. Through this we can see the seeming black cavern below, and in the monotony which hangs around us I almost feel tempted to jump down it to see where it goes to.

July 8th, Thursday. — I have hereinbefore mentioned that the greatest thickness of a single floe seen by us was seven feet ten inches, or say roughly eight feet. When, after ramming the ship through forty miles of leads last September, she was finally brought up, I pushed her into a crevice between two heavy floes which we subsequently found to be thirteen feet in thickness. I think this great depth was caused by the overriding of one floe on another, and regelation under pressure having taken place, the two became united as one mass. Mr. Dunbar, in his several tramps, has met ice which he describes as "so deep that you could now see how deep it was." This being rather vague, I directed him to-day to take with him a line,

with hook attached, to catch under these floes, and thus give a measure of their thickness. Upon his return he reports that he measured floes ten and twelve feet thick, and some fourteen and fifteen feet thick, and the surface was "from a foot to eighteen inches above the water." It is, of course, impossible that such thicknesses should be ascribed to any one single floe. I am satisfied that when water has frozen to a thickness of eight feet the ice forms a blanket which effectually prevents the radiation of heat from the water beneath, and thus makes further freezing impossible. Any further thickness is due to deposits of snow on the surface, or the shoving under of another floe and a union by regelation between the two. When, last November, we were squeezed out of our icy bed and pushed out into water, we were as truly floating for a time as if in mid-ocean. The next day, however, we were iced in. This freezing continued from November 28th to January 17th, by which latter date the ice had a thickness of forty-eight inches (four feet). Subsequent measurements were rendered impossible by the smash up of the 19th of January, when floes so overrode and underrode our surrounding ice as to jumble it all in a heap. When we commenced to dig a canal around the ship we dug through four feet of ice before the water flowed in on us, but that depth was due to piling up, of course, and not to any direct freezing. As our leak has almost altogether subsided, it is safe to assume that we are buoyed up by a floe of ice extending down and under the keel, which floe, being lightened by its surface thawing under the ashes and refuse we had spread around us, is enabled to float so much higher. One of these days, let us hope, this mass will break and let us down to our bearings.

July 9th, Friday. — The events of the day may be summed up in a few words. Our position shows a drift of one mile to S. 24° E. Encouraging, very. We loose sails for the first time in over ten months, and find them just as good as they were the day they were last furled.

July 10th, Saturday. — A day of almost steady rain and fog, and, to my sensation, more disagreeable in temperature than the coldest weather of winter. The thermometer ranged between 30° and 34.5°, but the dampness and moisture seemed to pierce to the bone and marrow.

July 11th, Sunday. — I succeeded in establishing our position to-day in latitude 73° 38′ N., longitude 177° 59′ 30″ E., showing a drift since the 9th of one and four tenths miles to N. 68° E. This seems to be worse and worse, for at this rate before many days we shall stand absolutely still. It is awfully discouraging to wait a couple of days for a sight of the sun (and hope, meanwhile, that you are drifting in some decent manner), and find at last that you have moved a mile. Had the usual Sunday inspection, followed by divine service.

Since the distilling has ceased we light a wood fire in the galley each evening to boil the tea water. Our empty barrels and boxes have accumulated largely, so we have quite a supply to fall back upon for occasional fires instead of using coal.

July 13th, Tuesday. — Observations to-day show a drift since yesterday of three and seven tenths miles to N. 13° W. We seem to be coming up slowly, ice and all, as indicated by the gradual falling of the water-level on our hull. Heeling 5° to starboard still, and that is also slightly increasing. Of course I cannot say

when this will stop. In order to get an idea of the correct thickness of the ice in our neighborhood (in case subsequent emergency should make it advisable to dig or saw out a dock, if possible, and make an effort to drag the ship into it), I directed Chipp to make borings, and he reports, as far as can be made out, the situation as follows : —

The ship is held firmly by a cradle of ice which, from the mainmast aft, averages five feet in thickness. (Under the stem it is five feet four inches thick below the surface of the water.) From ahead to the mainmast, about, there is a second floe piece which shoved under the first floe on January 19th.

Thickness of ice below the surface of the water : —

Under the stem	5 ft. 4 in.
50 ft. astern	4 ft. 3 in.
100 ft. astern	4 ft. 3 in.
150 ft. astern	5 ft. 0 in.
250 yds. starboard quarter	5 ft. 0 in.

The ice as a general thing has its surface about four inches above the level of the water. This is what is left of the direct freezing since November 30, 1879, of course thawing having taken place on the surface by reason of the sun's rays, and underneath by action of the warmth of the water, say 34°.

In company with Melville and Dunbar I walked one of Mr. Dunbar's mile estimates (about two and a half miles in fact) to the S. E., where there has been an opening affording seal shooting. In a straight line, as a bird would fly, it is about one and a quarter miles distant, the increased amount being caused by necessary detours, to go around small ponds which one cannot jump over, and which are in places over one's boot-tops in depth. These are, of course, formed from surface

thawing. Arrived at the "open water" it proved to be nearly closed, a width of six feet only allowing a look down in the depths below. The ice seemed to be about four feet in thickness, but looking only was very deceptive. In this precious lane there floated a broken portion of the floe, and anxious to realize the sensation of being under way again I embarked on it and pushed myself across. Near the old opening there was considerable dirty ice, with shells and small pebbles, showing that this ice had been on the bottom, or had rubbed along the land, or (query?) was it refuse matter left on it by a walrus? Near by we found a log of birch (?), heavy from water soaking, but sound and fresh at the fractured end. Not being able to bring it in we stuck it up in a hummock, that some men might let their dogs drag it in to-morrow. We started with three dogs, but not liking to wet their feet they ran away from us and returned to the ship.

July 14th, Wednesday. — Having great difficulty in getting any work out of our "hoodlum gang," Jack, Tom, and Wolf, a method of punishment had to be devised. Ordinarily they lie around on ash-heaps all day in the sun, blinking lazily, and ready to head an attack on some wandering dog in search of a bone, or more particularly sallying out to meet some dog returning with the hunters, who has incurred their grave displeasure by assisting at any work. The sight of a harness, merely, reminds them of a pressing engagement elsewhere; and the moving of a dog sled in their range of vision seems suggestive of the advisability of a change of base. Accordingly, each morning, when the ice has to be dragged in for melting, these three are occupied in surveying the work from a distance until it is completed, and then they unite in an attack

on those who did the dragging. They were caught by strategy to-day, however, and harnessed up; but Tom slipped his harness quietly and bolted, while Wolf chewed his through and escaped. When caught they were securely tied to a rope over the stern, and kept there until ten P. M., when, in order that their howls might not keep everybody awake, they were anchored with an ice-claw some distance off. This disgusted them. Tom took his punishment solemnly and quietly, but Wolf yelled incessantly, so much so, that Tom got provoked and thrashed him twice into silence.

Position to-day, latitude N. 73° 42′ 50″, longitude E. 178° 1′, showing a drift since yesterday of three and two tenths miles due E. Much fog and mist, and occasional drizzling rain, throughout the day. About one and a fourth miles N. W. of the ship there is a lane of water one fourth mile in width, and extending W. Mr. Dunbar plans going to it to-morrow and cruising on it in our skin boat. This is the baidera received at St. Michael's, which was originally forty feet long, but we have cut it down to about twenty-five feet, making it more portable, and when not in use easily hoisted under our cutter.

July 15th, Thursday. — Mr. Dunbar started out this morning, but soon returned, having found the lead of yesterday all closed up. Thus do things change in this part of the world. We made the discovery this morning that the ship had come up one inch forward, and gone down an inch aft, caused probably by the encradling underlying ice having melted sufficiently to change the point of support farther forward. It will give us something to watch from day to day.

The forenoon gave us very fine weather. At noon I got the latitude, showing, I am sorry to say, a small

southing. At two o'clock the sky became overcast, and from that time to midnight we had rain, mist, and thick fog. Although no material change occurred in the temperature (at midnight it was 32°), the sensation of cold was increased about 100 per cent. The mist, fog, and rain seemed to penetrate to one's marrow in the most aggravating manner, and reminded him forcibly of the warmer times we have been accustomed to at home, where no doubt this afternoon our friends have been suffering from heat and sighing for ice and the shade.

And thus, with our routine of eating, drinking, and sleeping, hourly weather observations, and the work of the ship, the day comes to an end, and, in the language of Mr. Wilfer, we can exclaim, "Another one of them gone."

July 16th, Friday. — Our observations to-day show a drift since the 14th of nine miles to S. 43° E. Rather discouraging as to direction, but hopeful as showing a loose condition of the ice, which admits of our readily moving in compliance with the wind. The open water (*i. e.* a crack in the ice), one and a half miles S. E. of the ship, has widened somewhat, and beyond it the ice seems broken up in large blocks, though from their uneven surfaces we cannot tell for how great a distance this broken condition extends.

While Mr. Dunbar and Alexey were out to-day, the latter shot a seal, and apparently killed it, as it lay stretched out on the ice. It was, however, only stunned, for, as Alexey approached it, it made for the water. Quickening his steps he reached it in time to grab it by the hind flipper, in an effort to hold it. But Mr. Seal was too sharp for Alexey, and managed to wriggle out of his grasp.

This seems to be the time for shedding the coat, as all our captures are made while the seal is out of water, getting rid of his old coat by friction on the ice. But they are rare in this neighborhood, for some reason or other. Had the spruce (?) log brought in which we found the other day.

July 17th, Saturday. — A day of not much interest. Much fog, mist, and rain prevailed, and during the afternoon snow fell. This is a nice showing for the 17th day of July, indeed. So slack does the ice seem, that a shift of wind is immediately noticeable in our change of drift.

July 18th, Sunday. — Another week has come and gone, and here we are yet held in bondage. This kind of life is most discouraging. If we were only drifting toward our goal, we would be somewhat content; but alas! we are steadily drifting away from it: or, if in our enforced idleness we were accomplishing anything for the good of science or human nature, it would be a comfort, — but instead of either we are simply burning coal to cook food to consume day after day. Over ten months of this imprisonment have we had, and in fact were it not that a certain indefinable, and I confess inexplicable something, keeps telling me all will come out right yet, I could hardly assign any reason why it should not last any multiple of ten months more. Currents there are none, except such as are created locally and temporarily by a wind. See-saw, see-saw N. W. with a S. E. wind, and then S. E. with a N. W. wind, and the same result with any other two succeeding winds. The surface water shows no increase of temperature that is not due to the air, and the bottom water has a temperature of 30°. Inspected the ship and read divine service, thus, as it were, making the

mark that distinguishes Sunday from other days in this part of the world as well as in other parts.

July 19th, Monday. — I cannot help thinking, as I turn over a new leaf and commence a fresh page, that I am wasting stationery in keeping a daily record of so unimportant matter as our daily life. Each night I am forced to admit that another day of our short season is slipping away without any result worthy of the spirit which conceived, and the enterprise which carried into effect, this present Arctic expedition. And the realization of our utter impotence to change our fate in any way makes such an admission doubly disagreeable. A bear in a trap, a bird in a cage, a ship in the ice, are alike held in bondage sharp and galling.

Of late, when one is tempted to feel blue, the sun, which, under ordinary circumstances, induces cheerfulness, rather adds to our disgust. For as that luminary provides means of determining our position, we are informed on each occasion how far we have gone backwards; or, in other words, how much nearer we are to the South Pole and how much farther from the North Pole. To-day, for example, we get observations for the first time since the 16th, and find we have been drifting, in these three days past, thirteen and four tenths miles to S. 8° W. And this, despite the fact that we have been having W. and N. W. winds. Job is recorded to have had many trials and tribulations which he bore with wonderful patience; but so far as is known he was never caught in pack ice and drifted S. and W. with W. winds.

Hoping to see something consoling, I took a team of dogs out to-day to the S. E., to the open lane of water; and after having been run away with twice and brought back to the ship by the dogs, I was forced to secure

the services of Alexey to get me to my destination. A white man inspires no fear among these animals. Reaching the open water I found it was about one fourth of a mile in width, enough to handle a vessel in under steam, but made a circle around the ship irregularly. I am satisfied that nearly all the ice in our neighborhood is of this last winter's formation, having frozen over the small lake into which we were squeezed out from among the heavy ice on November 25th last. The borders of our island are formed of ice of great thickness, perhaps forty feet thick, whose surfaces are about three feet above the level of the water. The ice which immediately surrounds us has an average thickness of say five feet, except where crowding, as for instance under our bows, has caused one layer to ride over or under another, making a thickness of ten or fifteen feet.

Owing to decay, the cradle of ice holding the ship is becoming specifically lighter, and buoying us up; for to-day the water-level stands at seven feet four inches forward, and eleven feet eight and a fourth inches aft. We are also slowly increasing our heel to starboard, it being now $5\frac{1}{2}^{\circ}$.

July 20th, Tuesday. — A day of no importance whatever. Desiring to learn something of the character of the ice at the borders of our island, I started at one P. M., accompanied by Melville and Dunbar and a heavy dog team. Going out to southeast, we got around to west in about two hours and a half; but as the sledging was in some places very bad over broken ice, the time was much longer than the actual distance would have required if on a level. The character of the ice is as indicated in yesterday's record, — one season's ice near the ship, and old and very heavy ice

on the borders. Excepting a very narrow lead at west going a short distance to north, I saw no way of getting out of this neighborhood, even if we were afloat and at liberty to move. As far as our floating is concerned, that must be left to time. To-day the water-level is at seven feet four inches forward, and eleven feet nine and one half inches aft, and our heel 5½° to starboard.

Gloomy, disagreeable weather. Surely we must be having a backward summer to have such a state of affairs at this date. As an addition to our trophies, a branch of birch and the skull of a codfish were brought in to-day.

July 21st, Wednesday. — Temperature between 31° and 34°, making one feel cold to the marrow of the bones. I can safely say that I did not feel one half as uncomfortable during the winter, with a temperature of minus 30°, as I do now at a temperature of plus 30°. The first was a hard, dry cold, which seemed to strike but glance off, while the last is a soft, wet cold that penetrates at once.

July 22d, Thursday. — This afternoon I started out with Melville, Dunbar, Aneguin, and a dog team, to see some more of our ice-island. I succeeded, however, in getting around from west to north only, the traveling being very rough indeed. Arriving at north, I found the lane of water closing up, the five foot (one season's) ice piling up in huge slabs on some very old and heavy ice. The sight and the sound quite carried me back to our experience during the winter. As the soft state of the surfaces rendered impossible the high scream which we used to listen to, there was not much of the terror inspired; but one could not help being impressed with the tremendous force with which these

blocks were crushed along, reared up, and tumbled over, and the silent grinning "surge" with which the force continued when one would suppose it counteracted and ended. Here I was ready to turn back, having been out three hours, and being wet through from wading and being dragged through ponds too wide to go around without immensely increasing the distance.

A truly wretched day, — squally, rainy, snowy, and what not. At six A. M. Chipp required seven letters to record the state of the weather, — o. c. m. q. p. r. s., — which shows it must have been somewhat mixed.

The surface of the water stands to-day seven feet two and three fourths inches forward, and eleven feet eleven and three fourths inches aft, the ship slowly coming up forward and settling down aft. A careful calculation shows that this gradual settling is increasing the leak slightly, for we now require 317 strokes of the pump in twenty-four hours against 240 a week ago; but as both amounts are very trivial they are not worthy of serious attention. Our windmill stands ready for work whenever there is any occasion for it.

July 23d, Friday. — Fog and mist and a little snow. Are we to have no summer at all?

July 24th, Saturday. — A day as uninteresting as yesterday, and it seems a waste of ink and paper to mention it. A little rain, a little snow, and general discomfort. And worse than all, but one more month remains of an Arctic season, and here we are held as if in a vise.

July 25th, Sunday. — One week more of summer has passed and gone, and we seem nearer to another winter than to any successful result. Regularly as clock-work we perform the same duties day after day, finding each morning the same surroundings we had the day before.

The monotony of doing nothing but waiting, waiting, is very trying. If we only had land in sight anywhere, I think we would risk a journey to it. Divine service followed inspection, as is usual on Sundays. Seal at dinner, with macaroni, tomatoes, etc., etc., as per bill of fare, and a glass of sherry with our corn starch pudding. As far as food goes we are in luxury.

Got to-day our first oogook (*Phoca barbata — bearded seal*), shot by Aneguin. She was eight feet long, and while her flesh is valuable for dog food her skin will make boot soles.

July 26th, Monday. — An unfortunate accident occurred to-day. Alexey had been out shooting, and brought back for examination a Remington cartridge, which had failed to explode in his rifle. Sitting down quietly, without any one noticing what he was about, he placed the cartridge between the thumb and finger of his left hand while he picked away at the fulminate cap with his knife in his right hand. Suddenly the cartridge exploded, and without detaching the bullet the shell flew out into ragged edges, which cut Alexey's left hand sadly, besides badly burning it with the powder. He was at once a much demoralized native, the shock affecting him considerably. The doctor, of course, at once took hold of the patient, and nothing serious is to be anticipated, beyond deprivation of his services for some days. The chances are that Alexey will be more respectful in his dealings with ammunition.

Generally speaking, the day was as gloomy as its predecessors. An almost steady fall of light snow until nine A. M., and this is the height of summer!

Some day or other some one, myself perhaps, looking over these pages will complain of their sameness and lack of interest. The popular idea is, no doubt, that

the record of daily life in the Arctic regions should be vivid, exciting, and full of hair-breadth escapes, or enjoyable and profitable because of the acquisition of valuable information. If the popular idea is the correct one, how dull and weary and unprofitable will the record of our cruise have been! I confess to so much disappointment and mortification that I am ashamed each day to make an entry in this book, and willingly defer it to the last moments before going to bed. What can I say that has not already been said over and over again? Here we are, held fast in the ice, drifting south instead of north, powerless to change our movement an inch, hoping to-day that to-morrow will bring a change; realizing to-morrow, when it becomes "to-day," that it is the same as yesterday was; seeing a summer(?) slip by without doing anything to retrieve our reputation or make us worthy of being numbered in the list of Arctic expeditions; full of health and energy, with zeal to dare anything, and yet like captives behind bars: add all these together, as making up the sum of one's sensations and experiences, and it will be seen that the surroundings are hardly favorable to glowing narrative or absorbing tale.

So thoroughly do we feel that we are accomplishing nothing, that some of us think that the food we eat and the coal burned to cook it are utter and absolute waste. Of what avail are health and energy if we can make no use of them? In the world we are not judged by what we can do, but by what we actually perform. In the case of an Arctic expedition, judgment is passed on results and not on the zeal or intention. A ship having the North Pole for an objective point must get to the Pole, otherwise her best efforts are a failure. No matter what the difficulties, or troubles, or accidents, the

failure to do the specified thing stands out in bold letters. So with us. We started for the Pole; we are beset in the pack in 71° plus; we drift northwest; our ship is injured, and we have to burn coal to save her; we drift back southeast; we are passing our second summer more unprofitably than our first, for then we were moving. No matter how much we have endured, no matter how often we have been in jeopardy, no matter that we bring the ship and ourselves back to our starting-point, no matter if we were absent ten years instead of one, — we have failed, inasmuch as we did not reach the Pole; and we and our narratives together are thrown into the world's dreary waste-basket, and recalled and remembered only to be vilified or ridiculed.

And yet I would not wish to be understood as implying we have given up the fight. We look for to-morrow with just the same faith and with as great expectations as we did on the 1st of June. But we do not spend to-day in idleness for all that. A full meteorological record is kept, soundings are taken, the dredge is hauled, specific gravities and sea temperatures are taken, astronomical observations made and positions computed, dip and declination of the needle observed and recorded, experiments made with ice and snow and surface water, birds shot and skinned, seals hunted, mechanics employed, ship's routine carried out, etc.; everything we can do is done as faithfully, as strictly, as mathematically as if we were at the Pole itself, or the lives of millions depended on our adherence to routine. Not a word is said about going back. Occasionally a trip is proposed somewhere, — to Paris, to Naples, to the West Indies, — to come off "one of these days when we get back." We go on with the regularity of a man-of-war in port. We look upon this place — the pack

— as a kind of Key West or Aspinwall, dull as a hoe and dreary to stay in, but bound to come in sometimes in a three years' cruise in those neighborhoods. And Jack's philosophy, "It is all in a cruise, boys; the more days the more dollars," comes in well apropos.

July 27th, Tuesday. — Excellent observations to-day show us a drift of one mile south since yesterday. Light snow falls nearly all day, and the temperature rises from 26° to 30°! Ye gods, ye gods!

July 28th, Wednesday. — A gloomy, disagreeable day, and a mile further south than yesterday.

July 29th, Thursday. — To-day becomes memorable as showing that we are again at the 180th meridian. Since the 27th we have drifted seventeen and two tenths miles to N. 84° E.

As I did not change our date when we passed to the westward of the 180th meridian on the 5th of May, no confusion of dates now occurs, although we were longer in getting to the eastward again than I had anticipated. I am glad that I did not change the date, for were we to vibrate from one side to the other an endless perplexity would follow any attempt to settle upon any particular date for an occurrence. Our great drift seems to show that the ice is slacker to the eastward of us than to the northward, for though in obedience to a strong S. and S. S. W. wind we should have gone N. or N. N. E., we have in reality gone E. and a half N. What is in store for us it is impossible to anticipate. If we have not had our summer yet, we may hope to do something next month. If our summer has come and gone, then, alas, our chances are slim. If one could see into the future how much anxiety might be spared in the present. It is very hard to realize that all our hopes and expectations should result in a weary drift

of two winters in the ice-pack, and it is difficult for a vivid imagination to see anything else if this be the warmest weather we can have this year.

Mr. Dunbar, whose duties as ice-pilot are limited to daily visits to the crow's-nest for a look at our surroundings, discovered this afternoon that a crack had occurred in the ice about half a mile north of us, and extending for a short distance east and west. Going out to examine he found it about fifty yards in extent, it being merely a separation of the old and heavy last winter's ice which surrounds us.

July 30th, Friday. — Our stiff breeze still continues. So melancholy has been our proceeding during the last two months that we welcome any change of direction as an improvement. We know that we could make nothing going N. W., and we hope we may do something going E. or N. E.

July 31st, Saturday. — The last day of the week, the last day of the month, and this page can end together. If this month is a sample of July weather here generally, I do not want to see any more of it.

August 1st, Sunday. — The new month cannot be said to open cheerfully, for we have our customary snow, rain, fog, and mist, with an overcast sky all day. At midnight we have the cheerful spectacle of salt-water freezing on the 1st of August. On the first Sunday of the month, of course, we had the usual Articles of War and general muster. Inspection and church followed.

To-day we lost one more of our dogs, "The Tease," I am sorry to say. Yesterday he appeared dull and stupid, and swollen. Being given some jalap he did not respond to treatment, but, to quote Chipp, in his account to Danenhower, "calmly passed away breath-

ing his last at three P. M." As we are of an inquiring turn of mind a post-mortem was held, Iversen acting as coroner, and it was found that the dog's death was caused by his swallowing a sharp bone, which cut through his intestines.

August 2d, Monday. — We have taken a new departure. Our position to-day I find to be in latitude N. 73° 20′, longitude W. 178° 36′, showing that we have drifted since July 29th N. 49° E. twenty-three and six tenths miles, or nearly seven miles a day. Our new departure consists in our starting off to the N. E., leaving the old backward track and going to a new part of the ocean. Though not exciting it has the air of novelty, and may prove the beginning of what, please God, will be a successful result to this hitherto valueless expedition; it is so hard to drift about in this uncertainty, while every day, nay, every hour, shortens an already too short Arctic summer. Arctic summer! have we any reason to speak of summer? Our average temperature for June was 30°, and for July 33°, and our warmest whole day thus far 38° (an ordinary cold winter day in New York). What a scampering would take place at Theodore Thomas' to-night if we exchanged temperatures with them! Four years ago to-day I was in Port Royal, S. C., with the thermometer 90° in the shade. What would I not give to have that temperature in these regions for a month or two!

About 8.30 P. M. an opening occurred in the ice about one quarter mile west of the ship, and extending for a short distance in a north and south direction, and wide enough to steam the ship in.

Our humdrum existence is occasionally varied by finding shells, pieces of sponge, or bits of wood on the ice. These are being uncovered by the gradual melt-

ing of the snow and ice, and, of course, we cannot say how long they may have remained there or how they came there originally. In the absence of facts, theories are as various as they are incongruous; in the Arctic Ocean shells may be ascribed to drift, to being brought up from the bottom by turning floes, or to being rejected by walruses in feeding. Any one will do to talk about to fill in an hour, of which, alas, we have too many idle ones.

August 3d, Tuesday. — No observations were possible to-day, for which I am very sorry, because I want to trace our progress this month very minutely. A curious occurrence is worthy of mention. Between five and eight P. M. a strong odor of burning brush-wood filled the air, and was noticed by everybody but myself, who, having a cold in the head, had no sense of smell; from six to ten P. M. a decided haze was apparent, but whether the haze and the odor of burning brush-wood can be connected in any way or not remains to be investigated hereafter. Nothing seems to come of the ice opening mentioned yesterday, and the ice in general seems to be compact again in all directions.

August 4th, Wednesday. — One more day come and gone, and nothing accomplished. This is becoming gloomy, indeed. Are we never to get the ship free again? Hope deferred maketh the heart sick, and our hope is surely deferred long enough. This is the month in which I expected to do something, no matter how little, and here we are, held as fast as we were in March.

August 5th, Thursday. — Last night at midnight we ended a meteorological year of hourly observations, and, as a relief to all hands in making them, I ordered hereafter three-hourly readings of the instruments instead of hourly.

August 6th, Friday. — At last I have good observations, and I find the ship is in latitude N. 73° 21′ 30″, and longitude W. 177° 14′ 45″. Since the 2d we have drifted twenty-four miles to N. 86° E., or six miles a day; I am disappointed, because I expected to find a greater distance accomplished. We have had as much wind in the past four days as we can expect during mid-summer, and the conditions of ice loosening are, one would suppose, at their most favorable point. It seems a certainty, therefore, that there is no expanse of open water east of us, and the ice is not slack enough to afford a passage. As day after day passes by, and no chance offers to accomplish anything, I feel my heart sink. To have zeal and energy enough to dare anything, and be held like a rat in a trap, seems the irony of fate.

August 9th, Monday. — Observations place us in latitude N. 73° 24′ 32″, longitude W. 176° 39′ 15″, a drift of one and seven tenths miles N. 22° E. since yesterday. We sound in thirty-nine fathoms, — and the lead line shows no perceptible drift; we have therefore come to a stand again, and unless something we know not of works in our favor, we shall probably zigzag again without aim or result. I cannot find words in any language which will express the sense of utter disappointment, shame, and mortification with which I am filled, in seeing a second summer fade away with nothing accomplished.

August 10th, Tuesday. — A gloomy, dreary, uneventful day. Fog or rain all the time.

August 11th, Wednesday. — Apparently our situation is growing worse each day instead of better. We made the unpleasant discovery to-day that the amount of the leak is increasing; for during the last twenty-four

hours 1,295 strokes of the bilge-pump were required to keep her free, and since July 15th, 240 strokes per day have been sufficient. Of course there is a reason for this, but unfortunately we have to guess at it. Measurements of the thickness of the ice at accessible places show a diminution of one inch since July 13th; and it may so happen that the wasting away of that amount of ice (whether at the top, and so causing it to float higher, or at the bottom, and accomplishing the same effect) has uncovered the damaged stem and presented a freer access to the water. This is conjecture simply; the fact is the water, and must be dealt with. We have the windmill for the present, and should we be held here another winter, we have, thank God, enough coal to run a pump in the deck-house.

August 12*th, Thursday.* — Observations to-day show a drift since the 9th of five and a half miles to S. 38° E. The irony of fate! How long, O Lord, how long?

August 13*th, Friday.* — Rainbow at ten P. M. Sunset at 10.20. This is the first time we have been able to see the sun at this interesting event since he recommenced his for-a-time-suspended habit of going below our horizon. Some little fog in the forenoon. These fogs please me, for they cut away the ice amazingly.

August 14*th, Saturday.* — Our mild weather continues, and as the winds hold from the northward and eastward, it must be occasioned by open water in that direction. This is no better than a conjecture, of course; for remaining fast in one spot we can only guess what may be the state of affairs fifty miles from us in any direction. Inasmuch as the high temperature and N. E. wind are accompanied by rain, fog, and mist, the conjecture of open water is a reasonable one.

August 15*th, Sunday.* — Our mild weather continues,

and so does the fog. It is surprising to see how this latter cuts away the ice. The full sun of June 21st did not do half the execution that to-day's fog accomplished. The ice seems actually to be rotting away. The surface is soft and spongy, and fully honey-combed; and but for the fact that there remains ice varying in thickness from two to twenty feet, there is no reason why we should not resume our voyage. The ship is still held affectionately by ice gripping her nearly down to her keel, and by its attempt to rise, heeling her over 7½° to starboard. Here and there on either beam, holes varying in size from one to six feet extend down through the ice, and at a distance of one half mile on the starboard beam, and one mile on the port beam, there is a narrow lane of water (starboard with a W. wind, port with an E. wind, neither with any other), which serves to make our immediate vicinity an island; so that if we could get to this lane we might have the pleasure of sailing around a circle, were we not meanwhile crushed by the ice coming together, for beyond the lane in any direction is ice of the cheerful and consoling thickness of twenty to forty feet. Inspected ship at ten A. M., and had divine service afterwards. Sounded in thirty-nine and a half fathoms, a marked drift to N. E. being indicated by the lead line. A curious fact, because we have had light breezes from northward and eastward all day, and this shows a drift to windward. Between ten and eleven P. M. had some heavy passing showers. At midnight a remarkably heavy water-sky showed itself to the southward.

August 16th, Monday. — Foggy and misty weather continues unchanged. Sweetman commenced altering the frames and stanchions of the deck-house, to carry out my plan of improving its arrangement next winter,

by beginning it at the bows, and so covering the spar deck over the entire berth deck.

August 17th, Tuesday. — And so day by day our glorious summer is passing away, and we are accomplishing nothing. It is painful beyond expression to go around the ice in the morning and see no change since the night before, and to look the last thing at night at the same thing we saw in the morning; and this has continued nearly a year already, and may continue — ? To start out full of zeal and energy, and to receive a stunning blow at the first step, is somewhat demoralizing. If we could only do something. Like Hamlet, I can say, "Wouldst drink up eisil? eat a crocodile? I'll do it" — And so I would, if by so doing I could change our position to one of usefulness. High as our temperature is (34°), foggy weather a daily occurrence, the most favorable occasions for getting rid of ice, except frequent and varying gales of wind to break it up and make openings, and yet here we are hard and fast, with ponds here and there two or three feet deep, with an occasional hole through to the sea. Is this always a dead sea? Does the ice never find an outlet? Surely it must go somewhere; for as the thaw in three months by no means equals the growth in nine months, it would require but a few years to make this a solid mass, and so take up this Arctic Ocean entirely. It does not get out through Behring Strait, for all ice met in Behring Sea, or nearly all, is the formation of that locality. It has no regular set in any direction, north, east, or west, as far as I can judge, but slowly surges in obedience to wind pressure, and grinds back again to an equilibrium when the pressure ceases. Are there no tides in this ocean?

Drifting about as we are, no tidal measurements are

possible. When last fall and winter we had our greatest pressures at new and full moon, their regular recurrence seemed to indicate that tidal action existed, but now the moon has no effect whatever. Full moon or new moon, last quarter or first quarter, the ice is as immovable as a rock. We are, of course, further north now than we were last winter, and may have got beyond the Siberian tides, while still south of the tides mentioned further north as ebbing and flowing through McClure Strait. In case this is so we should be in a dead space, and might, like Franklin's ships, never get any further. But what is there to the northward of us? It is hard to believe that an impenetrable barrier of ice exists clear up to the Pole, and yet as far as we have gone we have not seen one speck of land north of Herald Island.

Our water temperatures and soundings taken daily give no encouragement; the surface has generally a temperature of 34°, due, of course, to its exposure to the sun and retention for a long time of the heat imparted. Two fathoms below the surface the temperature is 31°, and at the bottom 30°. At a temperature of 7½° above the freezing point of salt-water, the lower ice cannot melt rapidly. On the surface, the sun's rays, or the cutting fog, or the warmer water at the edges, make a wasted and rotten material; but under water the ice has the same flinty hardness it had during midwinter. And it is of such irregular and varying thickness that no idea can be formed of its age or origin. We know that last November, when we were squeezed out of the heavy ice into our present location, we were in open water, — a lake, so to speak. By careful measurement we know that ice formed on this lake to a thickness of five feet four inches by February 4th. Then

its thickness could no longer be accurately measured, because of under-riding floes; but it is reasonable to suppose that it got a thickness of seven feet. On the 13th July that ice was five feet in thickness; to-day it is three feet five inches thick. Either we have had our summer, or are yet to have it, which latter sounds absurd on this 18th day of August. If the former surmise is correct, three feet seven inches may be taken as the thaw of one summer, and the remaining three feet five inches will form a basis for next winter. Already our little ponds have frozen over during the night, and remain frozen until noon of the next day. Thus much being said of ice which we have seen grow around us, how are we to discuss ice which is twelve feet, twenty-two feet, twenty-four feet, thirty feet, and forty feet in constant thickness? We see ice which has been piled up in confused masses twenty-four feet above the surface of the water, and can but guess at its thickness below. We drop a lead down to a projecting tongue twelve feet, and think we have the thickness of that floe at all events; but lo! a little further and we see another projecting tongue, or perhaps a third, or when we get to twenty-two feet we cannot obtain an up and down sounding by reason of surface irregularity.

August 18th, Wednesday. — Another day of ice scenery without any perceptible change in our surroundings. A marvelous temperature ranging between 31° and 40° makes me hope for some decent weather. To me to-day the temperature has been sultry and at times oppressive, the generally pervading fog seeming to intensify the effect of the heat. To our great surprise we get forty-four fathoms, with mud, gravel, and fine white sand.

Our sick-list had an increase to-day in the person of H. H. Kaack, seaman. While passing along the berth deck he fell, and striking his right arm against the corner of a hatch cover broke his elbow joint. The doctor has the case well in hand, and anticipates no serious result beyond being deprived of his services for some time.

August 19th, Thursday. — To-day the excitement was the killing of a bear. Mr. Dunbar started out this morning immediately after breakfast, and came back about five P. M. with the news. During the afternoon, while in company with Alexey, the latter called his attention from a little distance by call or signal agreed upon, — the note of a crow. Looking around, Dunbar saw, as he says, "the biggest bear he has ever seen, — a regular buster," — following in his tracks. He crouched down at once to let Bruin come up; but as the bear got within good range, say two hundred yards, of Alexey, before he reached Dunbar, Alexey fired and dropped him. We have learned up here that it takes many bullets to kill a bear, so no surprise was felt at seeing him jump to his feet and make off, though pumping out blood through a hole in his left side as he ran. Fortunately for us, he ran towards two men, Nindemann and Bartlett, who fired and finished him. Dogs were sent for the carcass two miles east of the ship, and they brought in a small bear six feet six and one half inches long, and four feet seven inches in girth, thus showing the effect of a sudden surprise on Mr. Dunbar. The body was honored with a burial in the ice to keep it cool and fresh, whether for our consumption or that of the dogs will depend upon their necessities. They are now fed about three times a week from the seal yard.

August 20th, Friday. — A day which can be disposed

of with but few words. Cloudy all day, except for a short time in the afternoon, when the sun broke through the clouds too late for a latitude and too early for a time sight.

August 21st, Saturday.— On pages 192 and 288 I have dwelt at some length on the nature of the water resulting from sea-water ice, and I shall add a word or two here on that subject before closing it. There can be no doubt of the importance of this matter in reference to the health of Arctic expeditions, for no man can receive continually or habitually as much salt in his system as we find contained in our ice without speedily becoming scorbutic. Though previous expeditions have asserted that they found and used ice sufficiently pure for consumption when melted (and ice formed from the freezing of salt-water at that), it is a somewhat singular circumstance that the crews became victims to scorbutic complaints. Dr. Walker mentions the circumstance of the men of the Fox digging too deep into the re-frozen ponds of melted snow, and getting ice too salt for domestic use.

Our experience this summer is as follows: On the 7th of July we succeeded in getting enough snow and surface scrapings, that is, broken down ice crystals from tops of hummocks, to fill our tank with water sufficiently pure for our use, for the first time since last fall. The steady glare and heat of the sun had melted and honey-combed the mass, and allowed the salt heretofore contained to filter through and deposit at the bottom. (Not all of the saline ingredients had so deposited, for a very faint milky tinge would appear in the water when tested with nitrate of silver; but the water was pronounced sufficiently pure for drinking.) This snow and surface crust were carefully scraped up,

put in barrels, and brought to the ship, where a cupful being melted from each barrel, a nitrate of silver test was applied, and the barrel accepted or rejected as the case might be. Regularly each morning was this arrangement carried out, some five or six barrels accumulating on the quarter-deck where the snow stood and thawed to some extent. From these barrels our supply was taken for melting in the galley for our uses. This morning an unusual degree of saltness in the new supply seemed to threaten our having got down to a line of salt deposit; and in the course of Dr. Ambler's tests he dipped a cup of water from one of the snow barrels, which had some days ago passed inspection, and he found it too salt for use, although a cupful of snow in that barrel being melted was found quite pure. This curious result is worthy of notice. The barrelful of snow standing in the sun had become soft and honey-combed, and the small amount of salt had dropped through with the drops of water and remained, of course, with them, leaving the snow so much purer. Of course it is impossible to say that the entire contents of a barrel are of the same character as the specimen cupful, some pure and some impure getting scraped up together; for it is plain that if the barrelful were no different from the cupful, the melting of one would give the same purity of water as the other. It is to be remembered, however, that the salter the water originally the lower the freezing point, and, consequently, the melting point, hence the salter ice commences to melt first and deposits its salt, which, falling into the liquid, makes a concentrated solution which may be unfit to drink, though the remaining snow will yield a potable material. Our method of examination and test is the only practicable one. Properly each barrelful

should be melted and the water examined; but this would consume more fuel than any ship could spare, and consequently it is out of the question.

The idea that I desire to fix is, that sea-water ice, under whatever circumstances it may be found, whether of temperature of the air at time of freezing, or number of thaws and re-freezings, or age, or thickness, or location, is a treacherous and unsafe element to use on an Arctic expedition, as an internal application; and no matter how much care may be exercised in its examination and test, the chances are ninety-nine in a hundred that sufficient salt will be received into the system by continued use to enfeeble it and prepare it for scorbutic attacks under any unusual exposure or exertion, even if its use does not produce scurvy alone and unaided. Having thus disposed of the salt question, about two lines will describe to-day's arrival and departure. A few hours' sunshine in spots, in early morning and at three P. M., fog and mist thence till midnight.

August 22d, Sunday. — The thirty-sixth anniversary of my birth, and but for an episode in the afternoon it might have passed away without reference.

Of late I have each afternoon been accustomed to take the dingy and scull around and through the little streams of water that have formed in our surrounding floe, watching the wasting of the ice, and making out in my own mind where a break may occur by connecting the several holes wasted clear through to the deep water. So narrow are these little streams, that in some of them one has just room enough to use two oars and row, and in many he is obliged to scull. So winding and intricate are they, that I am reminded of the maze at Hampton Court as presenting a parallel.

This afternoon I started off as usual alone, and had

rowed and sculled unconcernedly a mile or more, although at no time more than five hundred yards from the ship in a straight line. At this point I reached a long narrow lead which obliged me to scull, and facing aft, to use both hands, I, of course, saw nothing ahead. Thinking after a time that I must be near a bend I looked over my shoulder, and to my astonishment found my eyes resting on a bear not quite a hundred feet off, and who, judging by his looks, was quite as astonished as I was. The relative situation was worthy of a photograph. Here was a predicament. To run was out of the question for me, for it would have been too uneven a match had the road to the ship been a level and clear one instead of across alternate ice and water, which of course made it worse. There was no water between me and the bear, but I was jammed in a narrow lead and he stood looking at me. The water would have made no difference to him, though it would have to me. Looking a bear out of countenance is very romantic but not practicable, and I found the bear recovering from his astonishment and advancing toward me. I then yelled, "On board ship there! a bear! a bear!" but got no answer. Bruin by this time was about fifty feet from me, so close that I could see distinctly where the short hair ended at the edge of his beautiful black nose. Hearing my shout he stopped, and looked at me wonderingly. I again shouted, "On board ship there!" and somebody answered, "Halloa." Mentally calculating my chances I again yelled, "A bear! a bear!" and at the same time I raised an oar to fend him off should Bruin come to the boat. He stood still, however, and looked as if he could not quite make me out. Just then a string of men and dogs rushing around the stern attracted his attention, and he gazed at them

until, judging they meant him no good, he turned and ran, so fast that before the men and dogs could get on his trail he was out of range.

Lesson for me : "Never go away from the ship without a rifle."

Usual Sunday inspection followed by divine service.

August 23d, Monday. — It is now ten days since I have obtained sights, and by a singular circumstance they have been days of unusually high temperature; I say unusually high advisedly, because we have become so accustomed to experience a temperature of 32°, or under, that any excess is worthy of notice.

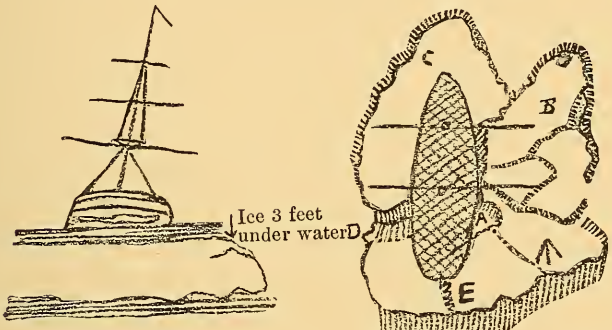
August 24th, Tuesday. — But a short time since and we were reveling in the enjoyment of a sun above the horizon the whole twenty-four hours; and to-night at midnight a lantern was necessary to read the anemometer. The thermometers having bright metallic surfaces are easily read without artificial light. For about two weeks we have had the cabin lamp lighted every evening at nine o'clock, the dark and gloomy weather we have had making it necessary. Alas, alas! a second winter before us and nothing done. Our daily hunting parties are coming back empty-handed. Seals enough are seen and shot, but they sink almost at once and are lost. This is their season for shedding their coats, and there seems to be a connection between that episode and the fatness of the seal (or the thickness of his blubber). Under ordinary circumstances a seal, when shot, seems buoyant enough to float until his carcass can be reached by a kyack, or by traveling on a cake of ice. But now the moment his skin is punctured down he goes. To-day Chipp and Dunbar saw four oogooks (or one oogook four times), but at too long range for a shot.

All reports seem to agree in pronouncing the ice in a wasted and disintegrated condition, needing only a fresh blow to send it into blocks and pieces. But by our ill luck we are having only light airs from the northward and a normal barometer.

August 25th, Wednesday. — A day of considerable interest, from the occupation in which we were engaged, and of great satisfaction from the results obtained. I have long been anxious to have a sight of our propeller, to know what injury it sustained during our numerous ice-squeezes and jams. Although I sometimes regretted not having triced it up last fall, upon becoming fixed in our icy surroundings, I could not help feeling during the crises of the winter, particularly on the memorable 19th of January, that its being down added greatly to the support of the rudder-post, and perhaps prevented its (the rudder-post's) destruction, and incidentally a crippling of the ship. An injury to the screw-blades we could endure, because we had spare ones to take their places, although if the blades were much bent or twisted, we should perhaps be unable to get them up to replace them by others. The ice surrounding the ship's stern had a thickness of nine feet in some places, and its surface was about two feet under water. Sawing it, therefore, seemed a herculean job, while blasting it with torpedoes might injure the ship. However, I determined to try sawing, and Chipp, with the tripod on the starboard side, and standing in the water to his knees, directed operations, while Nindemann, on the port side, similarly immersed, attended to that portion of it.

Suspending an anchor weighing about eighty pounds to the bottom of the saw, a rope was attached to the upper end, led through a block at the tripod head, and

then over the rail on board, where it was manned by some hands, while Chipp, with two men, pointed and guided the saw by means of a bar in the saw's upper end. During the forenoon the small sawing, picking, and chiseling were done on the port side, where a number of small holes were connected; and in the afternoon both sides were worked at. As soon as the tripod got near the ship the fall was led through a block on the mainyard, and the sawing proceeded with good speed,



A. Sounding hole.
B. Ice ten feet thick.
C. Tripod for sawing ice.
D. Holes through the ice connected by small saws, picks, and chisels.
E Place where floe broke in two.

(*From a sketch by Capt. De Long.*)

although laborious and trying to the men standing in the water guiding the saw. By 2.30 P. M. the saw had nearly reached the sounding hole, when, crash! bump! bump! the floe broke into two large cakes which came to the surface striking hard under our counter, and rolled and swashed like two whales. While some of the men got ice-claws, and with ropes dragged the cakes away, others rove off the propeller-purchase, and Melville went below to get the blades vertical. Upon trying to turn the shaft, he found that it would only go a little way, and we began to fear the blades were so bent as

to take against the forward side of the casing. When we ceased steaming last fall, the blades were left up and down, and in our ice pressures they had been turned about one eighth of a revolution. Fortunately when the ice was removed we could get the blades to a hoisting mark, although they would not revolve. So we hove away, and to our satisfaction up came the screw, and to our equal surprise and delight we found it in perfect condition with not even a scratch. It was, however, as bright as new copper, looking as if it had been freshly scoured. With a view to learning what the shaft's not turning was due to, I directed Melville to turn the engines over while the screw was up, and it was found impossible to get the shaft any further around than before. Ice may have formed and lodged in the sleeve of the dead-wood, and as this can be determined by removing the packing from the stuffing-box, we shall probably know more about it to-morrow. Lowered the screw again to its place, soon I hope again to be employed in beating the water to drive us on to the accomplishment of some worthy object. The consequences to the ship by the removal of ice from under the stern are logged by me as follows: —

"The ship immediately went down in the water aft seven inches, and came up forward one half inch; the water-level being now at a height of seven feet two inches on the stem, and thirteen feet nine and a half inches on the rudder-post. The heel is now $8\frac{3}{4}^{\circ}$ to starboard, having been increased only $\frac{1}{4}^{\circ}$ by the change of immersion. The ship is yet firmly held by ice, which extends from the main rigging on the port side around the bows, and to the after part of the fore rigging on the starboard side, and which, where possible to measure, is found to have a thickness of ten feet eleven inches. It probably extends under her keel, forming a cradle; and though it would perhaps be possible to haul the ship astern into a small

pool of clear water, it is not attempted for fear of increasing the facility with which water might enter through the damaged stem, and so require additional labor, or even steam-pumping, to keep the ship free. Without a single lead of water in any direction accessible to the ship, her being navigated is impossible, and there would be nothing gained by her being floated into a small lake."

Immediate examination showed no change in the amount of water coming into the ship, and as no water could be found coming into the supposed leak in the shaft-alley, it is now believed that the water there was caused by the melting of ice between the frames. And so this eventful day came to an end. Much work done and some pleasant knowledge gained.

August 26th, Thursday. — A day of considerable excitement occasioned by the advent of no less than four bears, and our killing one of them. About 1.30 P. M. Mr. Collins, while walking on the ice on the port side of the ship, saw a bear through the fog about one hundred yards distant. Giving the alarm, off started the dogs, immediately followed by Nindemann and Aneguin. Bruin of course turned and ran, and meeting a pond in his way plunged into it. It happened, however, to be inclosed, and before he could swim across it the dogs had encircled it and held him at bay, one of them, it is said, biting his bearship on the nose whenever he attempted to land. Aneguin and Nindemann coming up fired one and two shots respectively, Aneguin missing and Nindemann hitting, and the prize was our own. Of course we were all out there at once, and harpooning the carcass, dragged it to the ice, and thence to the burying-ground.

Hardly had the meat been buried, and our usual occupations resumed, than three more bears hove in sight,

this time on the starboard quarter. Collecting quietly on the poop we awaited, rifles in hand, their approach. The party seemed to consist of a mother and two nearly full-grown cubs. Our dogs were being fed on the port bow, and thus made no demonstration. Perfect silence reigned. Our past experience warning us of the small effect of a bullet at long range, and the ease with which a bear makes off when hit several times, we decided to wait until the bears would come no nearer, and then pour in a volley. Along the starboard rail were ranged ten rifles in rest: tableau!

The mother led the van, the two cubs following. Slowly and deliberately, head to wind, neck stretched out like a cow's neck, nose describing graceful curves in time with each step, Mrs. Bruin came along, falling lazily into the water lanes when she met them, swimming across slowly and reaching the shore, looking back to encourage her children to cross the briny deep. When the party reached a point which we considered two hundred yards distant from the ship they paused, and Mrs. Bear, seemingly distrustful of what she saw, and her nose scented, turned as if to retreat. At this moment, by preconcerted signal, we fired. Down tumbled the big bear, and one of the little ones jerking up a foot and shaking it seemed hit also. The cubs immediately closed on the mother, and while the three were in a heap the firing continued until the smoke hid the objects. At the first shot away went the dogs, followed, when the firing ceased, by Dunbar and Ericksen and others. When the smoke cleared somewhat the three bears were in full retreat, safe, if not badly hurt, because the dogs would not, and the men could not, cross the water lanes through which the bears went without hesitation. Jumping into the dingy, Chipp, the doc-

tor, and myself ran and sculled "across country," but our game was out of sight, Dunbar and Ericksen in chase. Going to the spot where the animals stood, we found blood, and followed it on two trails, so that we knew two of the bears were hit.

But we lost them. Dunbar and Ericksen kept on, and managed to drop the heretofore uninjured cub, but only for a moment. The many leads gave the bears too great an advantage, and though the trail indicated severe wounds, the chase might have continued for hours before any approach to an end would have occurred. Dunbar tells me he noticed the great care over and solicitude evinced by the mother for her young. The cubs being wounded were more disposed to stop than to go on; but the parent, though hurt herself, kept pushing them before her, covering their retreat and nosing them into the water in front, before she would leave the ice herself. It is too bad to hurt or disable these creatures, and have them suffer and die perhaps beyond our reach; but it is the fortune of war, and as we try to kill when we shoot, we cannot help it if we only wound. I am satisfied that unless at very short ranges, or a vital part is hit, an ordinary rifle bullet like a Remington or a Winchester is of no use. An explosive bullet is required. Unless dogs can surround a bear and hold him at bay, he may have half a dozen bullets in him and yet escape. Over ordinary ice the chase is too unequal for a man alone; over ice cut up by ponds and rivulets, as our neighborhood is, a successful chase is a physical impossibility. The water is too deep for a man to wade, and the dogs will run a mile before they will cross three yards of water. This, of course, gave us something to talk about

during the afternoon and evening, and all the changes on bears and bear-hunting were rung *ad infinitum.*

While the doctor and I were in chase we came to a place on the trail where one of the bears seemed to have sat down, for the snow was colored red for quite a space. Examining more carefully, however, we saw that it was "crimson snow," so-called (infusoriæ, about which, as to whether of vegetable, marine, or cosmic origin, so many diverse opinions are advanced). Gathering some of it the doctor examined it with a microscope, and he thinks it is pink-colored marine algæ, probably a species of protococcus.

Lest I have not mentioned it heretofore, I mention here that Mr. Collins discovered some magnetic particles (meteoric iron) in a lot of sand and gravel found on the ice two miles to the eastward by Mr. Dunbar.

When not engaged in chasing bears, our men were engaged to-day in sawing up and removing the ice which we displaced around the stern yesterday. The engineer's force was employed in trying to get the shaft to revolve. Uncoupled the engine from the line shaft, and found that the engine could be moved readily. Coupled up again and removed the packing from the stuffing-box of the stern bearing until the water ran freely to the box. Then tried to jack the engine and shaft as coupled together, but without much effect. The difficulty seemed to be in the stern-pipe or sleeve (as we supposed yesterday), as there was a noise as of grinding in the pipe, and supposing it to be occasioned by ice, the stuffing-box was so arranged as to admit during the night a small, steady stream of water to aid in thawing.

August 27th, Friday. — Another day of fog — impenetrable as a wall. Temperature, maximum 35°, min-

imum 31.7.° We continued to-day the work of cutting up and dragging away the pieces of broken floe, finishing it about five o'clock. All along our starboard side, from the fore rigging aft, we have "open water," a hole extending diagonally across the ship's keel from the starboard bow to the port quarter, and long enough to float the ship in should she slip from her cradle. In slueing a piece of floe this afternoon, a tongue projecting under water struck the ship's side abreast of my room, and though the shock was not great, it caused the ship to shake fore and aft, showing that the ice forward is balancing her weight so nicely that but little would be necessary to shake her off. I think it is a question of only a few more days' thaw and the Jeannette will slide into water again, and then we shall know what kind of a leak she has.

Melville continued the work of trying to turn the shaft again to-day, having allowed the water to run in slowly last night through the stuffing-box of the steam bearing, but little improvement was noticed. He therefore took out all the packing and let in a full head of water. This did the work. All ice seemed to disappear, and the engines, shaft, and screw could be jacked to a charm. We packed the stuffing-box, and now everything connected with the machinery is in perfect running order.

August 28th, Saturday. — By great good fortune I was able to-day to get sights for a Sumner, whereby I find the ship in latitude N. 73° 37′, longitude W. 177° 13′, and that is N. 42° W., twenty-four miles from our position on the 13th instant. How much we may have zigzagged, or how much ground she may have gone over, we shall never know. It is some consolation to know even where we are. A day generally of fog. Curious! a rising barometer with a southerly wind.

August 29th, Sunday. — Another week come and gone, and here we are yet. Of course it is for the best that we are here, else it would not be the case; but oh! how hard, and, in fact, impossible it is to draw any consolation from it. Our situation seems unchanged, and its continuance inevitable. Although I have been buoyed up during the last two weeks by the mildness of the temperature, and its probable wasting effect on the ice, even that comfort is removed now by a fall in the temperature early this morning, and the appearance of young ice on the surface of our ponds which did not disappear until near noon. Although passing a second winter in the pack is not a pleasant thing to contemplate, I do not think an officer or man shrinks from it because of the danger to be incurred, or the discomfort to be endured.

But we cannot help asking ourselves the question, "Shall we be any more successful when it has passed?" Here we have been nearly a year drifting with the ice to and fro, and we are about one hundred and forty miles N. N. W. of where we started. Let us suppose a year from now we are still one hundred and forty miles north of our position to-day (latitude N. 73° 41′, longitude W. 177° 13′), or say N. 76° 30′. We shall then be 800 miles from the Pole, and 500 miles from a Siberian settlement, with a disabled ship, no fuel, and perhaps as immovably jammed as now. Supposing our progress were in the same successive manner the next year, and so on, in six additional years we should reach the Pole. But what is the use of figuring it up — a man might as well attempt to demonstrate by mathematical calculation the day of his death. Let us deal with the present.

The long continuance of foggy, damp weather, and

the extent to which our men were obliged to be in the water while sawing ice, have led to the accumulation of a large quantity of wet clothes. In order to dry them I have ordered a fire on the berth deck, which, commencing on Friday, continued yesterday and to-day. This makes a sad expenditure of coal (145 pounds), but it is necessary for health and comfort that people should wear dry clothing. Sweetman continues his work of altering the deck-house for our possible winter's detention, and as he always makes a thorough finish of anything he undertakes, the altered house is as much like a new one as possible. He is as invaluable a carpenter as he is desirable as a cheerful shipmate, and I cannot be too loud in his praise. His exertions, with those of Nindemann, down in the fore peak on and after January 19th will always remain indelibly fixed in my mind.

Inspection and divine service took place as usual on Sundays. We sounded in thirty-seven fathoms, a drift to N. N. E. being indicated by the lead line. Light southerly breezes four miles an hour, freshened by midnight to ten miles, and yet a temperature at one time as low as 28.3°!

Have Behring Strait and the ocean south of us closed thus early? If so, by what accident shall we find water north of us? Fog, mist, and drizzling rain as usual, but I managed to get some fair sights, showing our position obtained yesterday to be reliable.

The outlook from the crow's-nest is dreary enough. Ice, ice, ice! In the little basin or valley in which we are numerous rivulets and pond-holes may be seen; but beyond what was once our encircling mountain ridge twenty to forty feet high, and now a ragged mass of confused chunks, is a seemingly endless ice desert, with

a black pool here and there, but no leads, no channels, no avenues of advance or retreat.

August 30th, Monday. — Our foggy weather seems to be ready for a change, for at ten this evening the fog rolled away from overhead, leaving a clear blue sky with a bright moon, and at midnight Jupiter and Aldebaran were also in plain view, being the first time that stars have been visible since last spring. As a thing to be remembered in connection with the dispersing of the fog, the temperature suddenly fell, and at midnight stood at 26.4°, and this too with a S. E. wind. It would seem that the water is disappearing to the southward, and a flock of phalaropes flying to the southward to-day would seem to indicate that the water is disappearing (if it ever existed) to the northward. What, then, is there in store for us?

Poor old Snuffy, having reached such a condition that it would be a mercy to kill him, was shot to-day. For some days his head had swollen to an awful size, and he had wasted away to a shadow. Lying on the ice, the heat from his body had thawed away a hole, and he was sinking gradually from view. No doubt, as far as his usefulness was concerned, he might have been killed months ago; but I felt that even a dog was entitled to his life as long as he could keep it in these uncharitable regions. However, the poor brute is gone now. His three companions, Prince, Tom, and Wolf, seemed unable to comprehend his disappearance, for they gathered around his old ice-hole in inquiring anxiety. But only for a time. The natural though miserable regard for self soon drew them to other things. What a life this is, when the shooting of a dog so impresses me that I give a dozen lines of my journal to its mention.

Our little lakes and rivulets were covered with ice at

midnight, and a white frost was deposited on all instruments at the observatory.

August 31*st, Tuesday.* — The last day of summer has come and gone, and, so far as our release is concerned, we are apparently no better off than we were on the first day of summer. A cheerful fall of temperature occurred during the night, and in consequence we find ice three quarters of an inch thick over all our ponds this morning. Three quarters of an inch does not seem like much in the abstract, but it was more than we could push, pull, or scull a boat through without cutting it ahead with an ice-chisel, and Melville and I who tried to do so are not the weakest of men. On the other hand, we had a remarkably high temperature in the middle of the day (35° to 37°), an almost cloudless sky, — in fine, a heavenly state of weather for these regions.

So bright was the sun that it was a pleasure to take sights. Excellent observations place us in latitude 73° 46′ N., longitude 176° 48′ 45″ W., showing a drift since the 29th of eight and one half miles to N. 53° E. The magnetic variation is 22° 4′ E. A reference to my drift-table shows that we have drifted this month altogether ninety-two and one half miles, and have made good fifty and one half miles to N. 51° E. Of all months in the year this month should give the slackest condition of the ice, and yet we have changed our position but little.

As if additional evidence that summer is gone, the aurora made its first reappearance after many days. At 11.15 P. M. a faint, tremulous arch could be seen passing from east through the zenith to west, and at midnight pulsating curtain patches moved from west to east, at an altitude of about 20° above the southern

horizon. The moon, Mercury, Aldebaran, and one or two other stars showed in the heavens after eleven o'clock. The engineer's force shifted about eight tons of coal from the starboard to the port side of the bunkers, in anticipation of our getting afloat and needing "straightening up."

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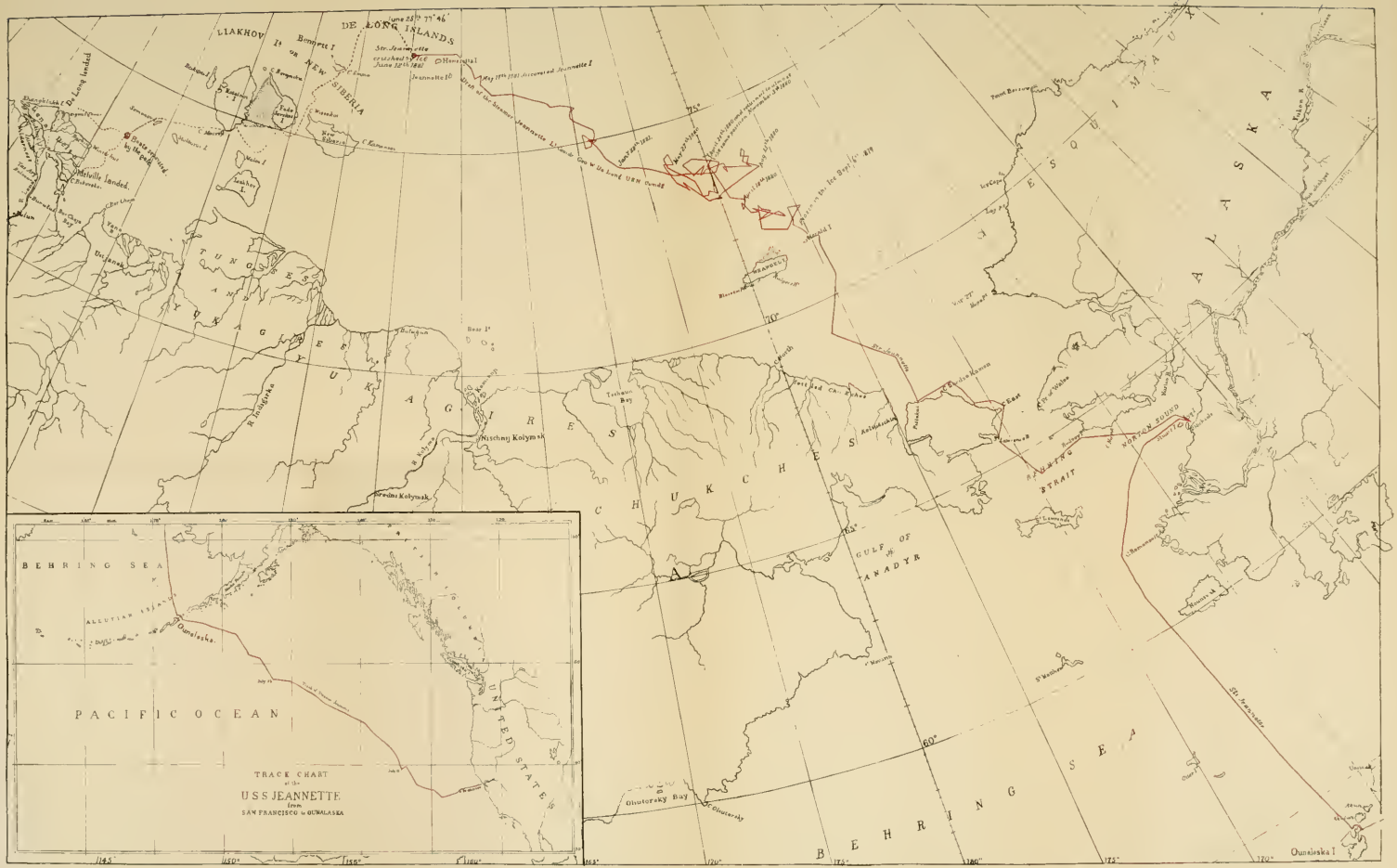

Track chart of the U. S S JEANNETTE, Lieut.-Comm. GEORGE W. De LONG, from San Francisco, up to the sinking of the ship; together with the route followed by the officers and crew in their escape over the ice to the Siberian coast.

Made from the Government Chart

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